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ABSTRACT

The intent of this booklet is to stimulate interest in individualized education, to promote study of it, and to encourage educators to experiment with the idea in ways appropriate to their local situations. Chapter 1 analyzes the concept of individualization. The chapter includes paradigms that may be helpful for examining some of the current programs in use. Chapter 2 treats administrative arrangements, curriculum materials, and delivery systems for selected comprehensive systems of individualization. Chapter 3 draws on research and evaluation studies to answer the question What do we know about individualization that can guide practice in schools? The fourth chapter offers suggestions to principals and teachers for individualizing instruction in their own schools, and an epilog stresses the need for teachers to expand their abilities to respond to the needs of learners. (Author/MLF)

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APPROACHES TO INDIVIDUALIZED EDUCATION

Jan Jeter, editor

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Foreword

Individualized instruction was fashionable in the 1960s; why publish a book on it now? Although there are those who might ask that question, perceptive educators know that adapting instruction to individual differences is not a passing fad. Individualization must always be our goal.

It is true that a great deal of effort was invested in the 1960s and 70s in the search for ways to organize schools and design curriculum so that instruction would be better adapted to individual differences. Numerous theoretical texts, as well as practical guides for the classroom teacher, were published. What have we learned that should inform our future efforts?

This question led ASCD to form a project team composed of people associated with several widely known models of individualized instruction. On the basis of their knowledge and experience, they were asked to consolidate what is known about individualization. And they have fulfilled that task admirably, with an approach that is both scholarly and realistic.

We must not assume that schools have the luxury of deciding whether or not to individualize. That choice is long gone. Schools *must* adapt to individual differences; that is the only way to assure continuous school success for each student, and it is our belief that the information and ideas in this book will help.

Barbara D. Day
President, ASCD, 1980-81

Guiding Thoughts on Individualized Education

Jan Jeter

Few would argue against adapting education to individual differences, but the term "individualized instruction" has no precise meaning. It may mean that students are free to progress at their own rate, but that all students are exposed to the same sequence of materials and the same instructional methods. Or it may mean that students are allowed to pursue some instructional objectives unique to their own interests and abilities. In still other cases, students go through the same curriculum at their own pace, but are allowed to choose among activities and to demonstrate mastery in different ways.

Broadly, individualized instruction involves adapting instructional procedures to fit students' individual needs and characteristics. Because there may be many ways to do that, no one method is necessarily best. The first step is to accept the basic premise that children of the same age have different cognitive and affective characteristics. They cannot be expected to learn the same body of content, in the same length of time, in the same way.

Evolution of Individualized Instruction

In the decades immediately preceding 1960, the self-contained, age-graded classroom was the standard in elementary schools. Elementary students received most instruction from a single teacher, and in many junior high schools, a student was likely to have the same teacher for language arts and social studies. Students were assigned to classes primarily on the basis of age, and all fifth grade students received the same basic instruction despite considerable differences in student ability. Students went through the same curriculum at the same rate. The only major exception to this pattern was in reading, where students often were grouped by ability.

In the 1960s, this organizational pattern began to change dramatically in many schools. The pressures for change came from a variety of sources. Psychologists were beginning to characterize students as active

learners, capable of creating and fulfilling their own learning needs. The development of programmed materials written for students of differing ability levels allowed teachers to individualize without having to produce large amounts of auxiliary materials themselves.

In that same decade, criticisms of the perceived quality of American schools also created pressure for changes in school organization. A number of books were published attacking public schools for a variety of shortcomings, including being insensitive to the needs of students. Some of the criticism stimulated educators to reexamine what the schools were doing.

Teachers working separately in self-contained settings had sometimes developed successful strategies for individualizing parts of their programs. The 1960s brought a new approach to individualization—the willingness of some school districts to break up age-graded curriculum, allowing students to study material related to their ability instead.

Perhaps the most influential force prompting school reform and providing direction for change was the concept of mastery learning. The works of John Carroll (1963) and Benjamin Bloom (1968) excited educators about the prospect of improving student learning by modifying group instruction. Carroll and Bloom agreed that most students could learn if given sufficient time and if their persistence could be aroused (see chapters one and two). Also influential were large-scale efforts aimed at designing, developing, and testing systems of individualized instruction. Three of these efforts are described in chapter two.

Direct Instruction: Compatible with Individualization?

In the 1970s, we learned a great deal about direct instruction. Several broadly based, correlational field studies were conducted in elementary schools: Soar and Soar (1972); Brophy and Evertson (1976); and Good and Grouws (1977). According to Brophy (1979), there was sufficient overlap and replication in these studies to provide dependable knowledge about relationships between teacher behavior and student learning of basic skills in the elementary grades.

The data from these studies seem to support what Barak Rosenshine (1979) calls "direct instruction" for teaching basic skills. According to Rosenshine, direct instruction is characterized by focus on academic goals, teacher-centered focus, little choice of activity, use of large groups for instruction, and use of factual questions and controlled practice in instruction.

These findings have raised questions about the desirability of individualizing education, but the concepts of individualized instruction and

direct instruction are not incompatible. It is quite possible to combine both concepts to form an effective instructional program.

Individually Guided Education (IGE), which is discussed in detail in chapter two, is an example of such a program. The IGE model calls for a combination of direct instruction and student work on individual assignments with individual goal setting and self-direction. The system calls for specification of basic learning goals by the teacher and the use of criterion-referenced tests to determine if students are progressing satisfactorily. The emphasis is on developing a system of education that helps students learn at their own pace in an instructional mode suited to their needs.

Unfortunately, school reform often occurs in an all or nothing manner: either all instruction is given to the class as a whole or students spend all their time working alone. Either teachers make all decisions or the structure is open and all students are expected to generate all goals and means of reaching them.

Individualized instruction can occur in many forms. Provisions may range from minor modifications in group instruction to students working alone. Programs may permit variation in any of a number of ways, including rate of learning, objectives pursued, methods and materials of study and required level of achievement.

A program is effective if it helps to achieve optimal program goals. If the primary goal is subject matter achievement, those students who are mature and possess self-study skills might well spend part of each day working individually on appropriate assignments. Those students who are not mature and who do not possess self-study skills might profit more from direct instruction in small or large groups.

When other goals, such as problem-solving or creativity, are perceived as important, additional learning modes have to be used. Perhaps the best approach is to think of individualization of instruction as the attempt to accommodate the needs of individuals within a particular group through a balance of instructional activity (independent study, small group instruction, large group instruction) that is appropriate for the members of that particular group and the goals the teacher wants to attain.

Plan of This Booklet

Intended for use by curriculum specialists, principals, and teachers, this booklet should prove helpful in sorting out the complexities of individualizing education. In chapter one, we analyze the concept of individualization. The chapter includes paradigms that may be helpful for

examining some of the current programs in use. Chapter two treats administrative arrangements, curriculum materials, and delivery systems for selected comprehensive systems of individualization. Chapter three draws upon research and evaluation studies to answer the question, "What do we know about individualization that can guide practice in schools?" The fourth chapter offers suggestions to principles and teachers for individualizing instruction in their own schools, and an epilog urges all of us to get on with the job.

Such an ambitious undertaking is not without problems. There are no final answers to the questions we address. Our intent is to stimulate interest in individualized education, to promote study of it, and to encourage educators to experiment with the idea in ways appropriate to their local situations.

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1

What Is Individualization?

Harriet Talmage

Throughout the history of American education, many groups have wrestled for the power to shape education. Diversity and equality are the central themes in the struggle. Tyack (1974) depicts the struggle in political and economic terms, while Curti (1959) examines change from a cultural perspective. Regardless of the terms used, the pendulum swings from diversity to equal opportunity, sometimes focusing on societal needs, at other times on individual needs. These shifting emphases have produced contradictory program thrusts. Thus we have bilingual and community control programs competing with programs fostering racial balance. We support diversity through special programs for the gifted while demanding equal opportunity. We strive to close the achievement gap, yet stress the idiosyncratic nature of the learner. We pride ourselves on the uniqueness of the individual, yet we decry divergent behavior.

Educators should not be faulted for taking what appear to be contradictory approaches. We are a heterogeneous people with differing orientations and needs. No single "best" response to societal demands is possible or even desirable. Thus individualized instruction assumes different forms. This single phrase is used to cover many educational approaches to the same as well as to differing societal demands. Some educational goals serve the individual: a well adjusted adult, academic competency, a life-long learner, or a self-actualized individual. Other educational goals, such as equal opportunity and racial balance, make society primary, although the welfare of individuals is also involved. Does equal opportunity mean the same opportunity for all with unequal results, or does it mean differential opportunities leading to similar ends? The former increases the achievement gap among groups; the latter threatens to place a ceiling on achievement and bodes ill for society generally.

Cronbach (1975) speaks of this goal dilemma. "Society needs to think once again about the kind of equality it would prefer and about

the desired relation between productivity, social status, and standard of living" (p. 11).

Americans are a people in a hurry; we seek immediate solutions and have little patience with persistent philosophic issues. The pressure is on the educator to produce "results," despite the lack of agreement on what results are desired. Obviously, a single solution does not serve everyone equally well. Our strength may be in the diverse ways we define individualized instruction, because we are responding to disparate goals of education.

The contrast between the educational philosophy of the Soviet Union and that of the United States highlights this point. I was asked to make a 40-minute presentation to the U.S.S.R. First Deputy Minister of Education and his entourage who were visiting universities in the United States. My presentation concerned the evaluation of instructional materials, using an analytic model for describing the design of the materials. The presentation was interrupted after the first 10 minutes by an animated discussion among the visitors conducted in Russian. Afterwards, the State Department interpreter posed the telling question as the visitors sat with satisfied expressions on their faces:

> The Minister cannot understand why you need to evaluate instructional materials. It is a futile exercise since the Ministry of Education prepares the curriculum and textbooks are commissioned to reflect the curriculum.

They were right, absolutely correct! If a curriculum is declared "the one best" curriculum, and the materials parallel the curriculum, there is no need for evaluation. But American educators contend with an open marketplace, choosing among tens of thousands of available materials, with the input of teachers, community members, parents, various interest groups, and, in some instances, students participating in the selection process.

The Deputy Minister, however, was relentless, seeing that he had the author on the defensive. Triumphantly he asked how long it would be before the United States would also have a single textbook. In effect, the Deputy Minister's comments swept away the need for further discussion of individualized instruction by negating academic differences, needs, interests, and ethnic sensitivities.

Americans choose to respond to diversity, for these very differences may well be our strengths. It surely is worth the effort to bring some semblance of order to the many meanings of individualized instruction because our vitality lies in these differences. Thus our quest should be not for consensus, but rather for a conceptual schema that can assist in sorting out the network of concepts associated with individualization.

Ways of Conceptualizing Individualized Instruction

One way we teach our students about the attributes of matter is through sorting activities. Given a bag of rocks, the student can sort or classify them in a number of different ways: size, color, shape, composition, or hardness. A given rock can be placed in one group on the basis of its color attribute and in another group on the basis of its hardness. Each classification offers an additional dimension to the student's understanding of the characteristics or attributes of the concept "rock." The sorting analogy also holds for individualization. There are a host of attributes that characterize individualization, and we can sort them in many ways.

In their study of teaching, Dunkin and Biddle (1974) suggest four categories for classifying variables associated with teaching. These variables also characterize many of the attributes of individualization, and illustrate the complexity of that concept. The following digression to discuss the categories proposed by Dunkin and Biddle forms the basis for identifying variables associated with individualization.

The first two categories contain input variables: the first Dunkin and Biddle label *presage* variables and the second *content* variables. Presage variables include characteristics of teachers that may affect the education process, including years of experience, sex, age, ethnicity, and the like. Context variables include student, family, community, school, and curriculum characteristics. These variables interact in a multiplicity of ways inside the classroom to form the third category: *process* variables, those variables dealing with instructional interactions. The fourth category encompasses the outcomes of classroom interactions; it is termed the *product* variables.

Given the range of differences among teachers, including their formative experiences, training, and personal characteristics, and the variety of student formative experiences and personal characteristics, add the school, community, and classroom contexts, and it would tax the most advanced computer operation to come up with all possible combinations of characteristics that could interact under the process category. Dunkin and Biddle (1974) note the enormity of possible interactions using only the school context, as a case in point.

> Schools differ depending on their physical facilities, the homogeneity of their teacher and pupil populations, the personalities and practices of their principals, the impact of their athletic programs. . . . Schools are also constrained both by law and custom. One school system features a rigid curriculum imposed by an authoritarian hierarchy, another a militant teachers' union, another a tyrannical and bigoted school board, still another a tradition of ex-

perimenting with both school architecture and classroom education. Each of these contexts is likely to affect the conduct and experiences of classroom participants (p. 42).

As if this were not enough to challenge designers of individualized instruction, Dunkin and Biddle leave the issues of educational values and societal priorities to others.

Given these variables as starters, other educators have provided different ways to examine individualized instruction. Sorting of the many attributes of individualization serves varying purposes: description, classification, analysis, and prescription. By means of description, the salient attributes of individualization are identified and described. Classification schema may be used to sort programmatic responses to individualization and to arrange the attributes under various rubrics. Relationships among the salient attributes are explained through analytical methods. Sorting has a prescriptive purpose when it suggests a means for arriving at stated ends. For this discussion, five examples of sorting the variables on selected attributes are highlighted to illustrate the above four purposes and the diverse ways American educators conceptualize individualization.

First, the Carroll model of school learning (1963) was selected because it stands as the seminal piece in this area of study. Its purpose is analytical. Important programs like Bloom's mastery learning (1976) and Glaser's adaptive education (1977) emanate from this model. The schema of Edling (1970; PREP, 1970) and Walberg (1971; 1975) exemplify the classification approach. These approaches are based on Cronbach's (1967) work on adapting instruction to individual differences, and classify instructional programs along salient attributes of individualization. Edling introduced a simple scheme for characterizing extant individualized programs, an approach that practitioners have found useful. Walberg presents a more sophisticated schema for classifying individualized programs. Talmage (1975) lays out a schema for describing the instructional design characteristics of individualized programs. The last approach presented for discussion (Hunt and Sullivan, 1974) builds on the aptitude-treatment, interaction research of Cronbach (1957), who is shaping much of contemporary thinking on individualization.

The Carroll Analytic Model

In the Carroll (1963) model, success in learning is predicated on spending the needed amount of time on a task. The word "needed" is the crux of individual differences. Five factors make up the model: three

factors are internal to the individual and two are external (for example, school context variables). The individual factors include: 1) *aptitude*, not to be regarded as a single trait but rather a composite of characteristics based on "generalized prior learning" that can be measured by the amount of time needed to learn; 2) *ability to understand instruction*, or the interaction between ability and instruction—some learners have a higher ability to understand instruction despite the quality of instruction; and 3) *perserverance*, extent to which the learner is willing to spend time on task. The school contextual factors include: 4) *opportunity to learn*, instructional time assigned to the task; and 5) *quality of instruction*. Factors one, three, and four are directly concerned with *Time*. Factor two, which is internal to the individual, can be mediated by Factor five.[1]

Carroll summarizes his model in the following sentence: "What is important to emphasize is that this conceptual model probably contains, at least at a superordinate level, every element required to account for an individual's success or failure in school learning (at least for the tasks to which the model applies)" (p. 733).

For Carroll, time is the critical characteristic of individualization.

The Edling Classification Approach

Edling (1970; PREP, 1970) characterized individualized instructional programs by a single dimension: locus of decision making. The model divides decision making into two categories: who makes the decisions about the objectives or goals of a lesson or program; and who makes the decisions about the means to employ in reaching the goals. The first level of decision making is curricular, the second instructional. The two levels form a matrix of four cells. Individualized programs with certain characteristics can be placed in these cells (Figure 1).

In Cell A, curriculum and instructional approaches are prescribed for the students. In Cell B, the curriculum is fixed by the teacher, or by the materials or district, but the learners select the means to achieve the curricular intents. Cell C permits the learners to select what they will

[1] Carroll proposed a formula for measuring the degree of learning based on the five factors:

$$\text{degree of learning} = f\left\{\frac{\text{time actually spent}}{\text{time needed}}\right\}$$

The numerator is equal to the smallest quantity of factor 1 (adjusted for factors 2 and 5), and factors 3 and 4. The denominator is factor 1 [adjusted for quality of instruction (factor 5) and ability to understand instruction (factor 2)].

Figure 1. Decision Making Model for Conceptualizing Instructional Programs *

		Curriculum: Teacher Materials School	Curriculum: Learner
Instruction	Teacher Materials School	A. Teacher/material/ school centered INDIVIDUALLY DIAGNOSED AND PRESCRIBED INSTRUCTION	C. Student/teacher contract PERSONALIZED LEARNING
	Learner	B. Teacher/material school prescribed; learner treatment SELF-DIRECTED LEARNING	D. Learner centered INDEPENDENT STUDY

* Modification of the Edling Classification Approach (1970).

learn, but the method for engaging in the learning is prescribed. Cell D gives the learners decision making control over what they will learn and how they will engage in the learning.

The critical characteristic of the Edling approach is choice.

The Walberg Classification Approach

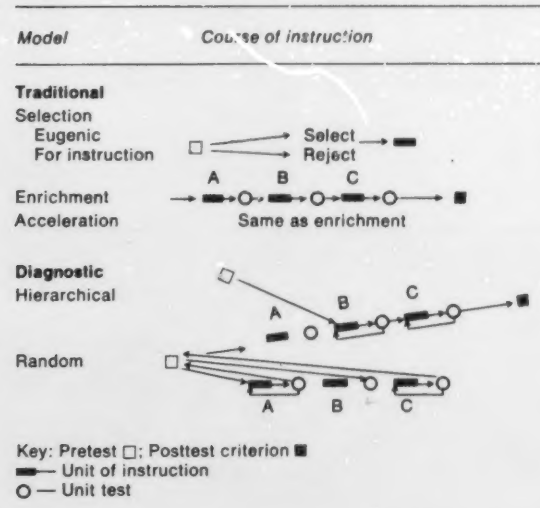
Walberg (1971; 1975) traced the psychological roots of present day individualized programs to two traditions: the continental tradition as exemplified by Rousseau, Froebel, Freud, and Piaget; and the Anglo-American tradition represented by Hobbes, Darwin, Pearson, Thorndike, and Terman. At one extreme, the continental tradition takes a romantic view of the inherent nobility of the child: ". . . the child's progress is based on standards relevant to his needs, age, culture, and experience, and the structuring and integration of knowledge . . . are stressed" (p. 8). On the other extreme, the Anglo-American tradition is behaviorist with emphasis on psychometrics, experimentalism, and structuralism. Thus in the name of individualized instruction, we find such disparate approaches as open education and programmed instruction. Recent systems of individualization, such as Individually Guided Education (IGE), draw upon both traditions.

Based on the continental, Anglo-American traditions, or a synthesis

of both, Walberg identifies models of individualized instruction under three headings: traditional, diagnostic, and models providing multiple learning routes. The traditional models include educational programs based on selection, enrichment, or acceleration. The selection model for individualizing instruction pre-selects students based mainly on achievement. Certain students are selected for a pre-med program, others for a business program, and still others for a shop-oriented program. The enrichment model provides everyone with the same basic program of study but adds in-depth work for those who can benefit from it. The acceleration model permits some students to go through the standard program at a faster pace. These traditional models, then, are based on time and pacing characteristics.

Figure 2 illustrates the traditional and diagnostic models. Of the two diagnostic instructional models, the hierarchical model assumes that learning progresses in a linear sequential route. Although everyone follows the same path, students enter at different points based on initial diagnosis of the level at which they can comfortably perform. Once their entry point is determined, students proceed through the balance of the

Figure 2. Traditional and Diagnostic Models*



* Adapted from Herbert J. Walberg, "Models for Optimizing and Individualizing School Learning," *Interchange* 2 (1971): 15-27.

program sequentially, but at their own pace. This model is most frequently used in individualized instruction today.

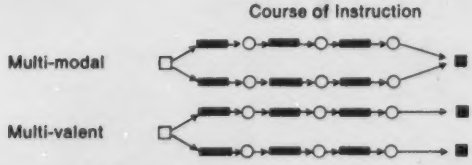
The random model is also classified as diagnostic, but the program differs from the hierarchical model in that the learning is not arranged in linear fashion. Each phase of the program is self-contained—one phase does not serve as a prerequisite for another—so the student can enter any phase of the program in any order. Within each phase, the student goes through the diagnostic model format—pretest, instruction, posttest—before going on to another phase. Many upper-grade science programs employ this model.

Multiple-route individualized instructional models are identified by Walberg as either multi-modal models or multi-valent models, as shown in Figure 3. The multi-modal model provides differential modes of instruction based on the learner's preferred learning modality, but the program, regardless of mode, leads to the same learning outcomes. The Biological Science Curriculum Study (BSCS) can serve as an example. There are certain desired learning outcomes, but these can be reached in different ways through the Blue, Green, Yellow, or the slower-paced versions of BSCS.

The multi-valent model provides different curricular emphases and leads to different learning outcomes. This model differs most significantly from all the other models in that differential learning outcomes are built into the program. Project Physics, developed at Harvard, illustrates the multi-valent model. The student can go the historical route, the mathematical route, the philosophy of science route, or the laboratory route in pursuit of physics. At the end of the program, students will understand different facets of physics.

The distinguishing characteristics of individualization in Walberg's

Figure 3. Multi-modal and Multi-valent Models*



Note: The Courses of Instruction may have variants of any of those shown in Figure 2.

* Additional models for individualizing instruction (from Walberg, "Models for Optimizing and Individualizing School Learning").

classification schema are time, decision making, and differentiated progression through the program.

The Talmage Descriptive Approach

Talmage (1975; EPIE, 1972) sorts the attributes of individualization in terms of instructional design. Fifteen components of instructional design are identified. The design shows how each component takes on certain characteristics of individualization. A profile of individualized programs emerges as each of its design components is mapped. The fifteen components are:

1. *General program objectives.* The general program objectives refer to the goals and underlying philosophy of individualization. Is the intent of individualization of instruction to encourage positive attitudes toward learning and reduce competition? Or is the intent to foster self-direction by providing the learner with alternative learning objectives? The first instructional design decision sets the general direction for the individualized program.

2. *Specific learning objectives.* The learning objectives, if achieved, should lead to the intended outcome behaviors. Some types of programs are designed with fixed outcomes, but others have variable outcomes. Whether fixed or variable, the decision must be consistent with the general program objectives. If self-directed learning is a general program objective, variable outcomes must be built into the program to permit a range of self-directed behaviors.

3. *Structure of the content.* Content must be organized in ways that make the learning experiences meaningful and reinforce the experiences for successful learning. Certain disciplines, such as history or mathematics, have a logical order for arranging the content. History is usually organized chronologically; for mathematics, a logical order is from simple to complex. Programs can be organized according to the processes of a discipline rather than by factual information.

Content that is linearly sequenced in short discrete steps may impede acquisition of self-directed behavior. Some forms of open education permit the structure of the content to emerge from the interests and activities of the learners.

4. *Sequence.* The way the content is ordered takes on a pattern. The content can be arranged in a linear or non-linear pattern; there can be a fixed entry point or a random entry point. The sequence must complement the program's general and specific objectives.

5. *Scope.* The scope is concerned with the breadth and depth of content coverage. In organizing the content for individualization, the designer makes decisions on how much, and in what detail, the content is studied. The final decision can be left to the materials, the teacher, and/or the students depending on the general progam objectives and the nature of the sequence. Students may be required to proceed through all the materials, or only as far as their interest and ability dictate.

6. *Branching.* Branching provides alternative routes for achieving the intended learning. Multiple routes are based on the learning styles of the individual, the interests, or specific problems the learner encounters.

7. *Recycling.* The organization of individualized programs can offer other routes for achieving mastery when the learner fails to accomplish the objective through the prescribed sequence. This is called recycling. Recycling could involve more repetition, a new set of similar learning activities using other modes of presentation, or a different arrangement of pupils for instruction.

8. *Teacher/student roles.* Teachers' roles and students' roles will vary according to the general program objectives and the content organization. The organization of a carefully structured, linearly sequenced program with a fixed entry point permits no deviation in the prescribed role for the teacher and students. Such a program may require the teacher to facilitate rather than to actively direct instruction. Other individualized programs require the teacher to be a diagnostician and prescriber. The students' role also varies according to the general program objectives. Students may find themselves in an active or a passive learning role, receivers of information, or organizers of their own learning activities.

9. *Management of physical learning environment.* The learning environment is identified, explicitly or implicitly, by the design of the program. It can range from closed to a totally open physical environment. A design that emphasizes social growth may call for a degree of movement and noise level that would not be tolerated in other designs.

10. *Grouping.* Individualized programs can vary in grouping arrangements from the single learner alone with a teaching machine to a variety of grouping arrangements: from peer tutoring to tutoring by adults; from small interest group to matched-pair learning groups or the total class as a group. More recent individualized programs take an eclectic view of grouping.

11. *Time and pacing.* In the past, time and pacing were considered

the critical components of individualization. For some, varying the time exposure to the materials was the basis for ensuring mastery. For others, pacing was the critical variable, and learners were permitted to proceed through a program of study governed by their own internal clocks. Most recently, individualized programs give high priority to socialization. It may be desirable to hold groups of learners together at certain steps and still provide differential pacing.

12. *Presentation modes.* Presentation modes encompass media, materials, and people—each are means of communication. Programs range from a single medium used by one teacher to a wide array of media, materials, and instructional personnel.

13. *Learning activities.* Learning activities are designed to respond to such questions as: To what extent should the learning stimuli be ordered, and in what manner? What kind of learning responses can be elicited by which learning activities? Can the learners engage in the same learning activities and arrive at different outcome behaviors? Learning activities can encourage rote learning, discovery of generalizations, or analysis of relationships to name only a few examples.

14. *Normative/criterion-referenced evaluation.* By what yardstick is the student's performance to be measured? Are learners being measured against group standards or against standards based upon the mastery of a given content or skill?

15. *Teacher/learner evaluation.* This component of design asks if evaluation suggestions and materials are primarily for the teacher's information or primarily for the learner's information. How much self-evaluation is provided for? An individualized program with self-direction as an objective has to consider self-evaluation as an essential design characteristic.

According to Talmage, a profile of an individualized program emerges as decisions are made about each of these components.

The Hunt-Sullivan Prescriptive Approach

Hunt and Sullivan (1974) propose a prescriptive model for responding to individuals. It involves the interaction of the individual and the environment which produces behavior unique to the individual. In the B-P-E model, B stands for behavior or learning, P stands for the person or individual, and E stands for environment or the learning task. According to Hunt and Sullivan, B-P-E is a feasible approach to breaking away from a normative view of learning.

> . . . Learning occurs within a person, and different persons learn different things in different ways. Psychologists have not been very successful in accumulating knowledge about such differential processes, but this should not lead us to return to the study of general principles that do not apply specifically to anyone. Rather, we try to deal with this complexity by gradually generating differentially applicable principles without being overwhelmed by our ignorance (p. 20).

Simply stated, each learner (person) interacts in unique ways with the learning task (environment). The consequence of the interaction is the outcome, or behavior. On the surface B-P-E appears to be similar to aptitude-treatment interaction (ATI) suggested by Snow (1976; 1977), Cronbach and Snow (1977), Berliner and Cahen (1973), and others. In actuality, ATI is an approach to doing research on individual differences and the analysis of data. B-P-E, on the other hand, is an applied approach that teachers and administrators can use to better respond to individualize education.

Hunt and Sullivan do not claim that B-P-E is the final solution to responding to individual learners.

> It should be clear by now that we realize fully that a teacher cannot accommodate to every student nor can an administrator initiate educational programs which will be matched to every student. . . . However, one may equally well analyze a specific situation such as a classroom, an educational program, or a counselor-client interaction in B-P-E terms (1974, p. 271).

Hunt and Sullivan offer a how-to-do-it format for viewing otherwise complex behaviors that are the products of person-environment interactions. They offer a four-step procedure: 1) state the problem; 2) translate the problem into a B-P-E diagram; 3) describe each component; and 4) collect information about the interrelationships among the components. The following example illustrates the way a teacher can use the model in prescribing instruction for an individual student.

The problem. Gerry, a third grader, is reading below her grade level. Her verbal responses and supportive home environment would suggest higher achievement expectations than her reading performance indicates. What factors may be contributing to Gerry's low reading achievement? The teacher has ruled out ability, poor socialization skills, and home support. When it's time for reading instruction, Gerry becomes easily distracted or otherwise lethargic. From this, it appears that lack of motivation may be a primary factor.

B-P-E diagram. Translating the data and possible hypothesis into a B-P-E diagram, the teacher can identify each of the components in the model. Of the three components, the environment—in this case the

learning task—needs to be explored. This is illustrated in the accompanying diagram.

B	P	E
Behavior during reading class indicates lack of motivation: easily distracted lethargic unresponsive	Gerry's reading achievement is below grade level. Teacher rules out: low ability poor-socialization skills lack of home support	What is it about the learning task that fails to motivate Gerry: materials? grouping? pacing? ?

Describe each component. The teacher expands on the diagram giving special thought to the learning task. Should the instructional materials be changed? Is Gerry assigned to the wrong instructional group? Should Gerry's assignments be less structured? Should Gerry have more opportunity to work at her own pace?

Collect information. The teacher tries out variations in the environment (E) that have potential for changing Gerry's behavior and studies her behavior under the new environment conditions. Does Gerry react more positively to the learning tasks when placed in a small group or when tutored? By testing each planned change, the teacher can determine which change produces the optimum level of motivation for enhancing Gerry's reading achievement.

Summary

By way of summary, let us see what the five examples of conceptualizing individualized instruction have to offer the educational practitioner.

Carroll's analytic approach offers a model of differential instruction based on time needed to learn. Bloom applied the Carroll model in formulating the mastery learning instructional approach. Presently mastery learning is employed in a variety of elementary and secondary classes across the United States. By providing variable time to learn and adjusting the modes of presentation to fit the learner, Block and Anderson (1975) report positive gains in achievement. Another application of the Carroll model is found in the Keller Plan (1968; 1974) which was first used with college students. This approach has been subsumed under the general title of Personalized System of Instruction (PSI). An indication of its wide application, a newsletter entitled *The Personalized System of Instruction Newsletter* has been published since 1973.

Edling and Walberg classify individualized instructional programs along selected dimensions. Both schema can assist teachers and administrators to examine individualized programs to determine their characteristics and to decide which programs best fit the school's or district's approach to individualization.

Talmage describes responses to individual differences from an instructional design perspective. Teachers can use the descriptions of program characteristics to build their own individualized programs and to check for internal consistency among the characteristics.

Finally, Hunt and Sullivan offer a procedure for analyzing a variety of educational problems. They propose examining the person variables and the environmental variables that affect the intended outcome variables.

Current Research on Individualization

Educational researchers are now systematically studying individual differences through research on aptitude for learning. As defined by Snow (1976), "Research on aptitude for learning is the study of individual differences in learning-related instructional conditions" (p. 52). The key terms in the study of individual differences are aptitude, environment, and interaction. Cronbach and Snow (1977) define aptitude as ". . . any characteristic of a person that forecasts his probability of success under a given treatment" (p. 6). Aptitude, then, as one domain or factor, represents the human condition. Environment, as another domain, represents the instructional condition. The interaction of the two is characterized by learning.

Inasmuch as aptitude and instruction each subsume a host of variables both known and unknown that covary within the respective domains, as well as interact between domains, to try to predict the resultant condition (amount of learning or achievement) is at best probabilistic and at worst a pursuit we should abandon. The idea of the "one best instructional method" conjures up images of the Soviet Ministry of Education. Researchers therefore are redirecting their focus away from trying to come up with a "one best" answer. They are less global in the questions they formulate and their answers are more situation specific.

There are two thrusts in educational research today that hold promise for giving direction to practitioners in understanding individualized instruction. The first direction is research in aptitude-treatment interaction (ATI); the second is research in education production factors.

Aptitude-Treatment Interaction

The contribution of ATI research to date is in moving research away from the pursuit of the "one best" syndrome. ATI even shies away from coming up with a grand formula for predicting the best fit between a set of human conditions and the set of environmental conditions that ensures successful learning. It has, however, pointed out to researchers ways to design their studies that attend to individual differences on a less grandiose scale. Over time, accumulation of research findings may yield some practical answers that suggest instructional conditions for responding to specific aspects of individual differences. The following are a few studies indicating interactions between aptitude and instruction that predict achievement.

Bennett (1976), in his study of open, formal, and mixed educational settings, reported differential academic achievement for different types of learners as they interact with open, formal, or mixed instructional settings. Low achieving boys in informal classes did not make as much academic progress in mathematics as low achieving boys in the other settings. One type of instructional setting is not best for all students. Boys with certain ability levels are served better by one type of setting than by another.

Brophy and Evertson (1974) found in their study of teacher effectiveness that students identified as low socioeconomic status achieve more when engaged in workbook type activities than in oral interaction, but the reverse was the case for high socioeconomic status students. In the same study, the researchers report that, for high socioeconomic status classes, challenging questions and demanding response format facilitate achievement; while for low socioeconomic status classes, drill-type questions and asking questions that students can answer are associated with achievement.

Yando and Kagan (1968) found that first grade students labeled as impulsive children, when placed with reflective teachers, tended to become less impulsive and more reflective.

From these aptitude-treatment interaction effects, it is evident that no single one way is best for all learners. But before we run to apply these new findings, we should heed Rosenshine's (in press) admonition that we not repeat the errors of the 1960s by rushing to implement innovative ideas from research findings that have not had a chance to mature or to be challenged. These findings, however, can serve as building blocks or as a data base for our understanding of individual differences,

and make us a little more respectful of the dimensions of the task in responding through instruction to these differences.

Education Production Factors

The second new direction in research that appears to be making headway in explaining individual differences in educational settings is the study of education production factors. Aware of the unwieldiness of working with so many potential factors associated with learning, researchers are identifying a small number of what appear to be the most salient factors associated with achievement gains. These factors include aptitude, motivation, age, home environment, quality of instruction, and quantity of instruction. Three of these are personal to the learner, the other three contextual (Walberg, 1978).

According to the education production theory, all the factors work together; increasing one factor alone would not be as effective as raising others as well. As an example, we can increase the quantity of instruction (amount of time) to the point where it will not only cease to increase achievement, but may well decrease it. Although the work is still in the realm of theory, we are beginning to learn a good deal about two of the factors educators have some control over: quality and quantity of instruction.

In his reviews of many studies, Rosenshine (1976; 1979) has found the following instructional characteristics positively related to achievement: careful planning (structure), direct instruction, business-like atmosphere, clear expectations, supervised seatwork, time engaged in meaningful academic tasks, and a warm teacher. While these characteristics may not produce equal achievement gains for all students, most students appear to do better under teachers who exhibit these instructional characteristics. We are also learning more about the way time is used in the classroom, examining both engaged time (time students actually spend on academic tasks) and nonengaged time (time students spend on nonacademic activities).

Out of this work may emerge a better understanding of the optimum combination of these factors for each individual learner.

Conclusion

It now should be clear why so many different conceptual schema are suggested as explanations of individual differences and instructional responses to these differences. Individualized instruction has at its core

a response to the individual. Because individuals are highly complex organisms, there are many different facets to which instruction could respond. The problem is compounded by having to respond to not one but 25 to 35 individuals who manifest different combinations of these characteristics. Additional factors that affect instructional responses are: differing societal demands, degree of tolerence for diversity, budget, our present state of understanding of individual differences, and the present state of our knowledge about instructional design.

Instructional program responses, to date, have not been as varied as the conceptual schema used to organize the body of knowledge about individualization. Most programs entail structuring the learning environment, providing appropriate learning tasks for individuals on the basis of some preassessment measure, permitting self-pacing, giving evaluative feedback for determining the next instructional steps, and providing some type of management system.

These programs respond to only a limited number of traits, mainly differential learning levels, student control of pacing, and, in some instances, student choice of learning activities. All instructional programs are bound by the constraints of the school organization and budget, thus limiting the ways we can respond imaginatively to other traits, or to more deviant characteristics within a given trait. To search for a perfect individualized program fitted to the needs of each person is a fantasy that diverts our attention from ways we can realistically respond to individual differences.

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2

Individualized Instruction Programs

Jan Jeter

Instructional programs to fit students' individual needs and characteristics have taken diverse forms. In this chapter we will examine some of these instructional programs. We will look briefly at various organizational or administrative arrangements that make individualized instruction possible, and explore two examples of curriculum materials designed for individualization. We also will look at different ways to organize curriculum materials designed for individualized instruction, the so-called delivery systems. Finally, we will examine a few systems of individualized instruction. These systems combine organizational arrangements with curriculum design to form a comprehensive system. In addition, brief discussions of the open classroom approach and Bloom's approach to mastery learning are included. These approaches are seen essentially as strategies designed to assist in the individualization of instruction; they are not viewed as comprehensive systems in themselves.

Administrative and Organizational Arrangements

Many plans for school organization and operation have been introduced to make individualized instruction possible. Most such innovations require modifications in school organizational arrangements. There are numerous plans for removing the age-grade barrier and permitting students to advance through the levels of schooling at more individual rates; "continuous progress," "acceleration," "retention," and the "nongraded school" are the names for some of them.

There also are numerous arrangements for dividing students into classes according to their intelligence, ability, or achievement. "Parallel tracking," "homogeneous grouping," and "remedial teaching" are examples of these arrangements. Team teaching was introduced, in part, to free teachers for small groups and individual work. These practices are attempts either to reduce the range of individual differences, or to

provide suitable organizational structure for individualizing learning. They are not programs of individualized instruction.

Curriculum Materials Designed for Individualization

Many curriculum materials have been developed to assist teachers in individualizing instruction. The *Wisconsin Design for Reading Skill Development* (Design) is an approach to reading skill development created within the Individually Guided Education (IGE) framework. The *Design* is an objective-based system providing both structure and substance for an elementary school reading program, kindergarten through grade six. Not a complete reading curriculum, the *Design* provides teachers with: a means for assessing each child's skill development on criterion-referenced tests; a management system for grouping of children and planning instruction for skill development; a plan for monitoring each child's progress; and media resource files for teacher use in planning instruction.

The *Design* is composed of six skill areas: 1. word attack, 2. study skills, 3. comprehension, 4. self-directed reading, 5. interpretive reading, and 6. creative reading. Instructional objectives for the six skill areas, criterion-referenced assessment devices, and informal assessment exercises have been developed.

Rationale and Guidelines (Otto and Askov, 1974) discusses all six skill areas of the *Design*. There is a separate *Teacher's Planning Guide* for the first three skill areas: word attack, study skills, and comprehension; and a single book for the last three areas: self-directed, interpretive, and creative reading. The planning guides include specific information needed to implement an objective-based approach to each skill area. Taken together, *Rationale and Guidelines* and the four planning guides tell a school staff how to plan and carry out the assessment, grouping, scheduling, and record keeping necessary for successful implementation of the program. All components of the *Design* are published by National Computer Systems.

Many commercial textbook series are now designed to enable teachers to provide for individual differences. Houghton Mifflin's *Mathematics for Individual Achievement* is just one example. This book addresses a wide range of classroom needs and suggests methods to provide for differences both in learning rate and in content coverage. Behavioral objectives and self-checking pre and post tests are built into pupils' texts. Other items, such as additional testing materials, teaching materials, and drill and practice materials, also are available. Specific suggestions are given for a variety of classroom management strategies.

For teachers with a commitment to laboratory instruction, a section on the laboratory approach is provided.

Delivery Systems

Well-conceived curriculum materials are not enough; an effective delivery system is mandatory—a system which effectively customizes a program to individual differences among learners. One very popular example of such a delivery system is computer-assisted instruction.

PLATO is one multi-media adaptive system that combines a responsive typewriter or digital device, tapes, films, slides, and other audio-visual aids with computer programs. It provides an automated means for individualizing student instruction while simultaneously serving large numbers of students. After the teacher selects a lesson, the computer presents this material to students while monitoring and evaluating their performance. Each student can work at his or her own pace, receiving instantaneous reinforcement for correct work and having access to special information when problems arise. To improve instruction, instructors may rearrange lesson material, write their own lessons, or assemble a curriculum from a catalog of available lessons. PLATO lessons are usually integrated with additional classroom activities and free the teacher for special work with students.

Another approach to individualization is the Annehurst Curriculum Classification System (ACCS), which provides a way to match individual learners with curriculum materials. Central to ACCS is a concept of human variability and a conviction that pupil performance is affected by the relationship of curriculum materials to student characteristics. Thus, each piece of curriculum material may be classified in terms of ten human characteristics: experience, intelligence, motivation, emotion-personality, creativity, social, verbal expression, and auditory, motor, and visual perception. Each item is further categorized according to one of 10 major academic disciplines, with several subordinate classes of subject matter, media format, and appropriate age level.

ACCS, then, is a way of classifying, organizing, storing, and retrieving curriculum materials. To use the system effectively, some means of keeping track of thousands of curriculum materials becomes essential. Many schools already make extensive use of computers, so adapting ACCS to an interactive, on-line computer operation would be very simple. Others might use sorting rod files, or any one of a number of information storage and retrieval systems. Even a card file system could be used. Many different types of hardware systems will do the job. (For more information see Frymier, 1977.)

Comprehensive Systems of Individualized Instruction

Among the better-known and widely implemented systems for individualizing instruction are: Individually Prescribed Instruction (IPI) (Glaser, 1968; 1970); Individually Guided Education (IGE) (Klausmeier, and others, 1977); and the Utah System Approach to Individualized Learning (U-SAIL) (Hales, 1978). All of these approaches strive to involve the student actively in the learning process, allow students in the same class to be at different points in the curriculum, and permit the teacher to give more individualized instruction.

Deciding which is most appropriate for a particular situation calls for systematic comparison of the programs.

We selected these three systems—Individually Prescribed Instruction (IPI), Individually Guided Education (IGE), and Utah System Approach to Individualized Learning (U-SAIL)—for analysis because these programs are among the best known and most widely adopted in schools across the country. Representing different approaches, they are based on different interpretations and inspired by different philosophies and theories.

While our discussion is based on books, papers, and reports, programs are often implemented differently from the way they are reported. There is data demonstrating as much difference in the behavior of teachers using the *same* program as among teachers using *different* programs (Good and Brophy, 1978). Furthermore, programs are constantly changing, so our descriptions of the programs may not reflect recent modifications.

Individually Prescribed Instruction (IPI)

Exploratory studies on the use of programmed instruction in 1961-62 led to an experimental project on the feasibility of individualized instruction in an entire K-6 school in the 1963-64 school year. Under the direction of the Learning Research and Development Center of the University of Pittsburgh, the Baldwin-Whitehall public schools, a suburban Pittsburgh school system, decided that classroom organization had to be more flexible if instruction were to be more individualized.

This impetus led to what became Individually Prescribed Instruction (IPI), in which various combinations of instructional materials, testing procedures, and teacher practices are used to accommodate individual student differences.

The IPI program is a highly structured system for grades kindergarten through six in mathematics, reading, science, and spelling. In the IPI program, students work at their own pace on individually prescribed

learning activities. The level at which the student works, the specific objectives pursued, and the nature of the study are determined largely by a series of criterion-referenced tests. An overall view of how the system diagnoses learning needs and prescribes learning activities for individual students follows.

1. A series of placement tests is given to each student at the beginning of the school year. The results indicate the level of mastery in each content area and pinpoint the specific units on which study should begin.

2. For each unit of study, a pretest is administered covering the unit objectives. This is to determine which objectives or skills have already been mastered (typically at 85 percent level) and which need further study. If all have been mastered, the student simply moves on to the pretest of the next unit.

3. The teacher evaluates the pretest results and writes learning prescriptions for achieving the objectives yet to be mastered. A student may be assigned to individual tutoring, text materials, audiovisual materials, or group work.

4. The student obtains instructional materials independently and works on each nonmastered objective in the unit, one at a time. At specified intervals in the sequence of instruction, the student completes a curriculum-embedded test, which measures the student's mastery of the objective on which he/she is working. If the student demonstrates mastery of the objective, he/she moves on to the next objective in the unit.

5. When a student has demonstrated satisfactory achievement on all objectives in a unit, a posttest covering the unit as a whole is administered. The posttest is an alternate form of the pretest and measures performance on all objectives of the unit.

6. If the posttest indicates mastery is not attained on some of the objectives, instruction is repeated for those skills. If mastery is demonstrated on all objectives in the unit, the student moves on to the next unit. This may be in the same content area of the subject (for example, addition) but at a higher level, or in a different content area (for example, subtraction) at the level indicated by the placement test. In any event, the student takes the pretest on the new unit and repeats the process.

A teacher spends much of his/her time in administering tests, diagnosing learning needs, writing learning prescriptions, analyzing student progress, and providing individual guidance to students. Very little time is spent in lecturing, but some time is devoted to instructing small groups

of students who have common learning problems. Typically, tests are scored by teacher aides or, in some cases, by the students themselves.

Clearly, the IPI system is based on a set of specified instructional objectives in each subject covered by the system. The objectives provide the basis for organizing the curriculum, and directing the students' individual study. The curriculum for each subject contains a series of behavioral objectives that have been arranged by content area, sequenced into learning levels, and grouped into units of instruction. (For more details see Bolvin and Glaser, 1968; Scanlon and Brown, 1970.)

In terms of the Edling classification schema, IPI falls into the Individually Diagnosed and Prescribed Learning category, with some overlap into the Self-Directed Learning category. Schools with the following characteristics should find IPI in harmony with their individualization goals: 1) emphasis on students' cognitive development; 2) predisposition to retain an age-graded organizational structure; 3) desire for accountability; and 4) resources for instructional materials for each subject and for one paraprofessional per classroom.

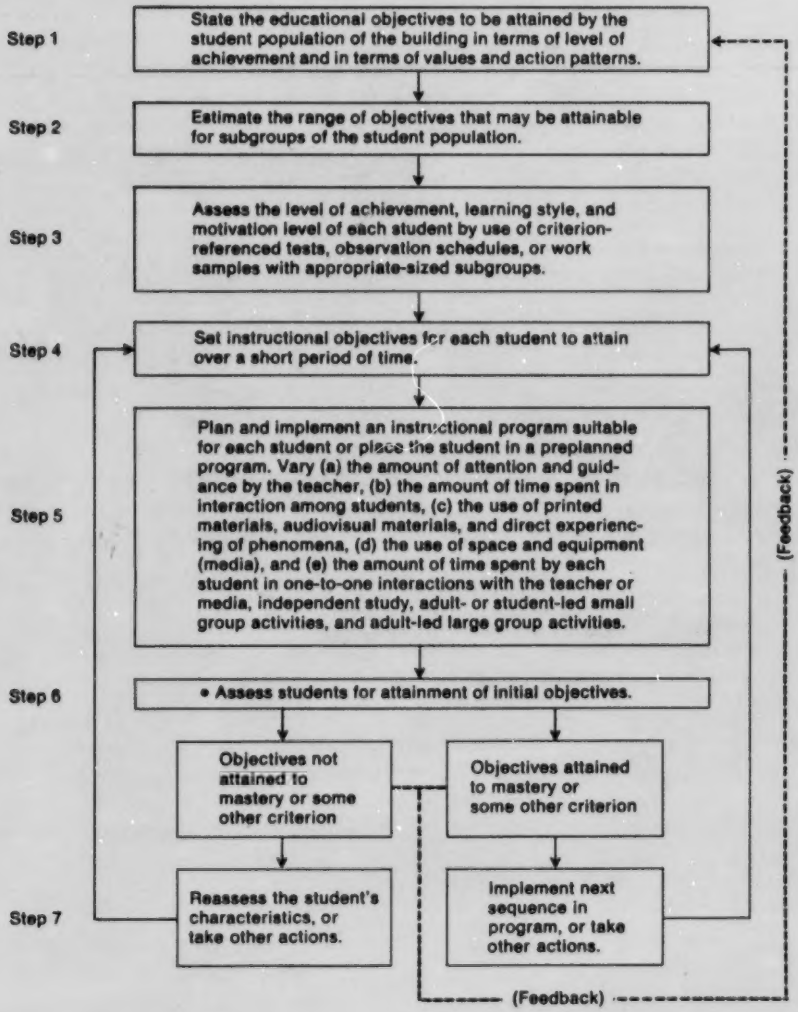
For more information on the IPI mathematics program, contact New Century Education Corporation, 275 Old New Brunswick Road, Piscataway, New Jersey 08854. For information on IPI reading, contact Research for Better Schools, 444 Third Street, Philadelphia, Pennsylvania 19123.

Individually Guided Education (IGE)

Individually Guided Education (IGE), developed at the Wisconsin Research and Development Center for Individualized Learning, is another major individualization effort. Here the emphasis is on helping students learn at their own pace with instruction suited to their particular needs. IGE is a comprehensive system of interlocking components.

The seven components of an IGE school are: 1) a unique set of organizational-administrative arrangements and processes, 2) instructional programming for the individual student, 3) evaluation of student learning tied to instructional programming for the individual student, 4) compatible curriculum materials, with instructional programming for the individual student, 5) a program of home-school-community relations, 6) facilitative environments in the school district and state, and 7) continuing research and development to keep IGE attuned to changing societal conditions. According to Klausmeier and others (1977), the two key components of IGE are instructional programming for the individual student and the organizational-administrative arrangements that make it possible.

Figure 1. Instructional Programming Model in IGE


Step 1
State the educational objectives to be attained by the student population of the building in terms of level of achievement and in terms of values and action patterns.
Step 2
Estimate the range of objectives that may be attainable for subgroups of the student population.
Step 3
Assess the level of achievement, learning style, and motivation level of each student by use of criterion-referenced tests, observation schedules, or work samples with appropriate-sized subgroups.
Step 4
Set instructional objectives for each student to attain over a short period of time.
Step 5
Plan and implement an instructional program suitable for each student or place the student in a preplanned program. Vary (a) the amount of attention and guidance by the teacher, (b) the amount of time spent in interaction among students, (c) the use of printed materials, audiovisual materials, and direct experiencing of phenomena, (d) the use of space and equipment (media), and (e) the amount of time spent by each student in one-to-one interactions with the teacher or media, independent study, adult- or student-led small group activities, and adult-led large group activities.
Step 6
• Assess students for attainment of initial objectives.
Objectives not attained to mastery or some other criterion
Objectives attained to mastery or some other criterion
Step 7
Reassess the student's characteristics, or take other actions.
Implement next sequence in program, or take other actions.
(Feedback)
(Feedback)

(Adapted from H. J. Klausmeier, M. R. Quilling, J. S. Sorenson, R. S. Way, and G. R. Glasrud, *Individually Guided Education in the Multiunit Elementary School: Guidelines for Implementation* (Madison: Wisconsin Research and Development Center for Cognitive Learning, 1971).

IGE instructional programming should not be confused with the linear and branching programmed instruction of the 1960s, or with Skinnerian principles of learning. Advances in aptitude-treatment interactions (Cronbach and Snow, 1977); learning styles (Messick and Associates, 1976); mastery learning (Carroll, 1963); and instructional design (Markle and Tieman, 1969; Klausmeier, 1976) are incorporated into the model.

The traditional age-graded self-contained classroom is replaced with an Instruction and Research Unit (I and R Unit) which includes a cooperative instructional team headed by a unit leader (who is also a teacher), the staff teachers, sometimes other personnel, and 100 to 150 students. The main functions of this team are to plan, implement, and evaluate instructional programs for individual students in the unit.

The administrative arrangement in IGE schools, the Instructional Improvement Committee (IIC), is composed of the principal and the unit leaders replacing the principal as the sole decision maker. The principal and unit leaders share in curriculum planning, decision making, and coordination of all aspects of the school program.

The Systemwide Program Committee (SPC) at the school district level includes district personnel, representative principals, unit leaders, teachers, community persons, and others. This committee arranges for the support needed in IGE schools and also coordinates districtwide matters.

IGE, an eclectic educational system, is a comprehensive innovation, embracing the schools, the community, and programs of teacher preparation. IGE teacher preparation is clearly delineated with a variety of materials for college preservice teacher preparation programs available (Klausmeier and others, 1977). Classroom curriculum materials are detailed and coordinated with teacher preparation materials. (For more details see Klausmeier and others, 1977.)

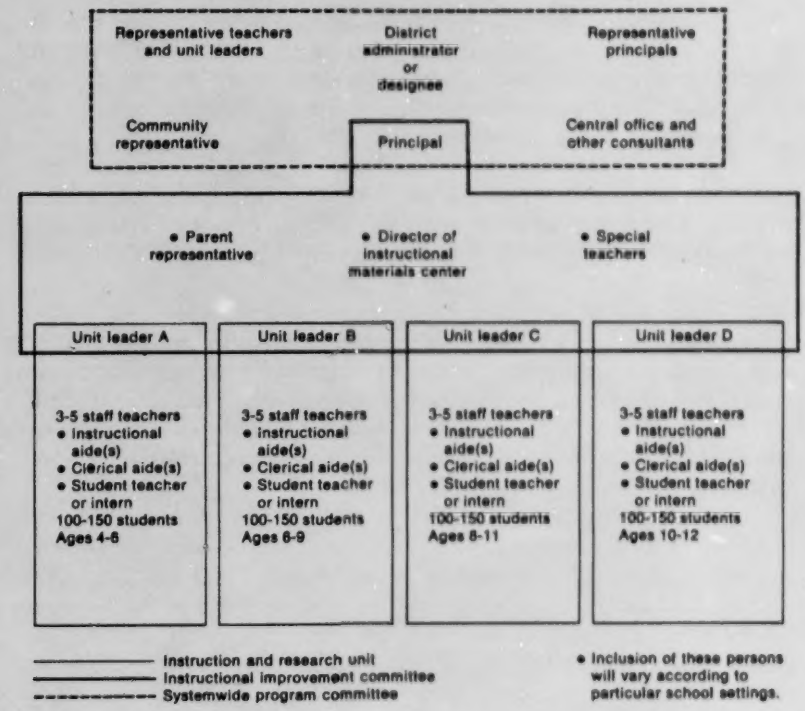
In Edling classification schema terms, IGE fits all categories, with more emphasis on Diagnosed and Prescribed Learning and Self-Directed Learning than on Independent Study and Personalized Learning. Contrasting IGE and IPI, IGE leaves instructional decisions in the hands of the teachers; IPI materials are more prescriptive. Schools with the following characteristics should find IGE compatible: 1) willingness to exchange the traditional age-graded structure for the multiunit school organization; 2) commitment to a comprehensive staff development program; 3) resources to hire instructional and clerical aides and to invest in materials and consultative help during the initial years of implementation; and 4) desire for accountability.

For more information on IGE, contact the Association for Individually Guided Education, Suite 318, North Center, 4319 Covington Highway, Decatur, Georgia 30035.

Utah System Approach to Individualized Learning (U-SAIL)

A consortium of eight Utah local education agencies in partnership with the state education agency is responsible for development of the

Figure 2. Instructional-Administrative Arrangements of an IGE School of 400-600 Students



(Adapted from H. J. Klausmeier, R. G. Morrow, and J. E. Walter, *Individually Guided Education in the Multiunit School* (Madison, Wis.: Wisconsin Research and Development Center for Cognitive Learning, 1968).

Utah System Approach to Individualized Learning (U-SAIL). In 1970 the consortium was formed to develop an approach to individualization of instruction in reading and mathematics for grades 1-6.

An open-system model was designed, giving specific steps to be followed in planning, organizing, installing, and evaluating the program. Each component is influenced by, and influences, every other system component. The model is supported by inservice training in system implementation for administrators and teachers, and by U-SAIL curricula designed to assist in diagnostic/prescriptive teaching in elementary reading and mathematics.

In classroom practice, the teacher sets goals and plans the program using the steps in the model. Resources are organized to give the teacher the opportunity to work with individuals, small groups, or large groups of students. Planning instruction and organizing the physical environment precede actual teaching. A planning paradigm aids the educator in decision making. It is utilized in phase one and is used in succeeding phases as efficient organization, effective classroom management, and precise instruction are realized.

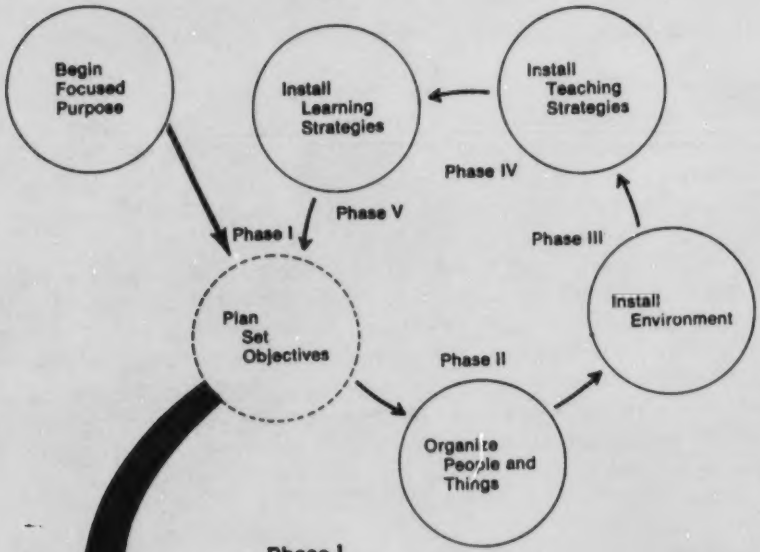
In mathematics, concrete materials such as money and blocks are used. Materials are coded for immediate access. A student is tested, a diagnosis made, and the student is assigned to groups according to ability. A humane environment for learning is considered to be critical. After a concept has been taught to a group, options available for practice are itemized on records kept by each student. The teacher monitors, re-teaches, and holds conferences with each student as needed. Practice, both in amount and kind, varies from student to student. Immediate knowledge of results is given, and a concept test is administered.

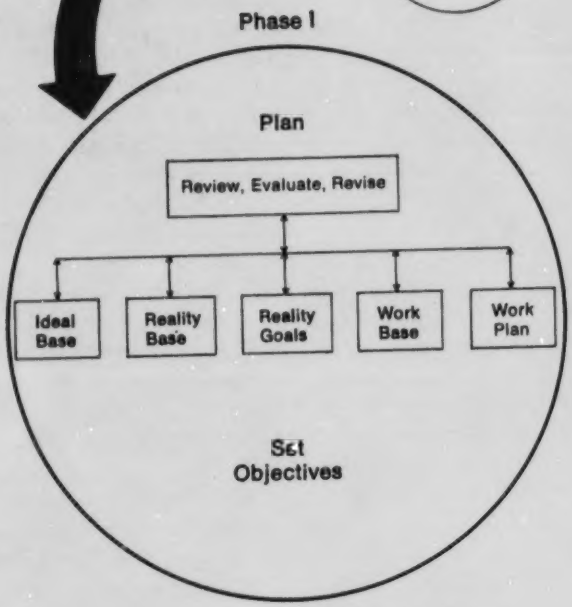
Experiences, made as real to life as possible, are provided in which the student applies what is taught. Throughout the experiences, the teacher provides five minute total class drills in computation skills each day. From three to six instructional groups, plus individual student activity, are operational at any given time. This system enables teachers to utilize available resources in increasingly efficient ways.

In reading, system implementation is the same. Both teacher-initiated, regularly scheduled conferences and student-requested conferences are on-going in reading and mathematics.

As the student reaches each stage, there is increased opportunity to self-select, plan, organize, follow-through, and evaluate his or her own work. Movement is in a continuous progress framework from dependence to independence. The principal serves as an instructional leader, monitoring and assisting. All system components are always operational

U-SAIL Procedural Model





U-SAIL Planning Model

and influence the behavior of teachers and learners as they manage, teach, and learn. (For more details see U-SAIL monographs.)

In terms of the Edling classification schema, U-SAIL appears to fit into all the categories, with a slight emphasis on Diagnosed and Prescribed Learning.

For more information on U-SAIL, contact Project U-SAIL, P.O. Box 9327, Salt Lake City, Utah 84109.

Individually Prescribed Instruction (IPI)

1. GENERAL PROGRAM OBJECTIVES	General objectives embrace all the subject areas where instructional products have been disseminated, to enable students to work at their own rates through units of study in a learning sequence.
2. SPECIFIC LEARNING OUTCOMES	Clearly specified, fixed, pre-selected instructional objectives in each subject covered by the system.
3. STRUCTURE OF THE CONTENT	Objectives provide the basis for organizing the curriculum.
4. SEQUENCE	Objectives are sequenced into learning levels—Pupils follow same sequence.
5. SCOPE	All students proceed through all objectives of a unit.
6. BRANCHING	Occurs in a limited way to meet interests and learning styles.
7. RECYCLING	If mastery not attained on some of the objectives, instruction is repeated for those skills.
8. TEACHER/ STUDENT ROLES	Teacher spends much time administering tests, diagnosing learning needs, writing learning prescriptions, analyzing student progress, and providing individual guidance to students—Students' roles rather passive when it comes to initiating activity.
9. MANAGEMENT OF LEARNING ENVIRONMENT	Furniture arrangements tend to be flexible—Movement of students as they use a variety of materials.
10. GROUPING	Primary pattern of grouping for instruction is independent study, individual work—If a student doesn't master a particular objective he/she may be assigned to peer working or small group activities.

11. TIME AND PACING	Student works at his/her own pace.
12. PRESENTATION MODES	Work on each unit follows prescribed methods and materials.
13. LEARNING ACTIVITIES	Students generally engaged in individual work using a variety of materials (texts, audio-visuals, others).
14. NORMATIVE/ CRITERION REFERENCED EVALUATION	Types of evaluation include: (1) Placement tests which measure student mastery of various units in each content area, (2) Unit pretests which measure student performance on each objective in a unit selected for study, (3) curriculum-embedded test which measures student mastery of the particular objective for a unit, and (4) Unit posttest which measures student mastery of the objectives in a unit that has been studied.
15. TEACHER/ LEARNER EVALUATION	

Individually Guided Education (IGE)

1. GENERAL PROGRAM OBJECTIVES	Set by the Instructional Improvement Committee of each school building.
2. SPECIFIC LEARNING OBJECTIVES	Depending on the curricular field, 8 possible combinations of the following factors: common or variable objectives, full mastery or variable attainment of objectives, an invariant or a variable sequence of instructional units.
3. STRUCTURE OF THE CONTENT	Depends on curricular area.
4. SEQUENCE	Varies as to curricular area and individual units of instruction—some have a variable sequence, others have an invariant sequence.
5. SCOPE	All students required to proceed through a certain part of the materials, some students may go beyond that scope.
6. BRANCHING	Branching occurs—Alternative routes for achieving objectives based on individual learning styles, interests, etc.
7. RECYCLING	Recycling provided for in the instructional programming model for IGE.

8. TEACHER/ STUDENT ROLES	Roles vary according to curricular area and individual units of instruction. At various times the teacher is a diagnostician, direct instructor, facilitator, etc.—Students find themselves in an actual learning role much of the time, assisting in setting objectives, etc.
9. MANAGEMENT OF LEARNING ENVIRONMENT	Use of space varies as to learning activities occurring.
10. GROUPING	Students instructed as individuals, peer-to-peer tutorial, student-to-adult tutorial, in small groups, in large groups, or in a combination of these modes.
11. TIME AND PACING	Students proceed through many units of instruction at their own pace—At certain steps large groups of learners are held together.
12. PRESENTATION MODES	A wide array of media, materials, and instructional personnel utilized.
13. LEARNING ACTIVITIES	Learning stations utilized—Wide variety of learning activities.
14. NORMATIVE/ CRITERION REFERENCED EVALUATION	Evaluation, objective-based, and is a part of instruction occurs 3 times: (1) at the beginning of a unit of instruction, (2) during the instructional sequence, and (3) at the end of a unit of instruction.
15. TEACHER/ LEARNER EVALUATION	

Utah System Approach to Individualized Learning (U-SAIL)

1. GENERAL PROGRAM OBJECTIVES	Set by local agency.
2. SPECIFIC LEARNING OUTCOMES	Depends on curricular area. Terminal objectives delineated into detailed instructional objectives in reading, language arts, and mathematics. (These are modified to accommodate local agency needs.)
3. STRUCTURE OF THE CONTENT	Depends on curricular area.

4. SEQUENCE	Varies with curricular area—some have a somewhat invariant sequence, others do not.
5. SCOPE	All students are required to proceed through some materials; some go beyond others in terms of breadth and depth.
6. BRANCHING	Branching occurs—learning style, level of thinking, interests, etc., are considered.
7. RECYCLING	Recycling is provided for.
8. TEACHER/ STUDENT ROLES	Roles vary according to curricular area and unit of instruction. Students have opportunity to make independent decisions beyond requirements set.
9. MANAGEMENT OF LEARNING ENVIRONMENT	Use of space varies with learning activity in operation.
10. GROUPING	Students are instructed as individuals, in tutorial situations, small groups, large groups, and combination of groupings.
11. TIME AND PACING	Students work largely at their own pace—in some instances small groups are kept together.
12. PRESENTATION MODES	Presentation modes vary. A variety of learning materials, media, and teaching personnel are involved.
13. LEARNING ACTIVITIES	A variety of learning activities are used.
14. NORMATIVE/ CRITERION REFERENCED EVALUATION	Evaluation is objective based. It includes pre-, post, and interim, informal and/or formal testing at the unit/multi unit levels. In mathematics and reading placement tests are utilized.
15. TEACHER/ LEARNER EVALUATION	Students and teachers provide on-going feedback through written and oral retrieval system use.

Some Important Questions and Considerations

In addition to describing various systems of individualized instruction according to the Edling, Talmage, or any other approach, there are several important questions that school personnel should consider before adopting any program. Questions such as cost, inservice, additional staff, and hardware needed come to mind immediately. The following chart attempts to answer a few of these questions about the three previously discussed systems.

	IGE	IPI	U-SAIL
1. What about cost?	Varies from school to school	Depends on number of programs	About $3 per pupil per content area if project developed materials are used; less if system alone
2. Is inservice needed?	Awareness Session-Sch. Dist. Leaders, Principal-Unit Leader-3 days inservice all year	8 day workshop for administrators-same for teachers. Continuous inservice	3-5 days staff training with 1-2 follow-up inservice as needed
3. What support services are provided?	Leadership materials available, other materials also available		Training options offered by U-SAIL Project staff
4. Are new curriculum materials needed?	Not necessary, but recommended. Materials should include clearly stated objectives, assessment tools, etc.	Yes	Project materials are not necessary, but recommended
5. Is more staff needed?	Varies from school to school	Aides are needed	No
6. Do existing staff members assume new roles?	Yes, one new position, unit leader, created—all staff members participate in instructional programming for students	Yes, teacher becomes diagnostician, prescriber	Role dimension emerges as competencies are increased
7. Is a computer or other hardware needed?	No	No	No
8. Is it a total system?	Yes	Yes	Yes
9. Are architectural changes necessary?	No	Rooms might possibly be modified for storage or activities	No
10. What implementation time is necessary?	In one year organizational changes can be made and instructional programming begun in one subject		1 academic year per content area

11. Is evaluation data available?	Yes-Contact Wis. R & D Center for Individualized Learning, 1025 W. Johnson, Madison, Wis. 53706	Yes-Contact Research for Better Schools, 444 Third St., Phil., Pa. 19123	Yes-Contact Carma Hales, Director, U-SAIL, P.O. Box 9327, Salt Lake City, Utah 84109

The Open Classroom

The open classroom is more free and unstructured than any of the systems discussed previously. The open classroom concept has succeeded in many British primary schools, and many schools in the United States are working with the idea. In contrast to the three systems of individualized instruction discussed previously, the open classroom does not require sets of behavioral objectives. Rather, its objectives are developmental in nature.

While no two open classrooms are exactly alike, it is true that they tend to have their own "look." Room arrangement does not simply refer to how the furniture should be placed; it is the educational purposes the teacher has in mind, and the processes used to achieve them.

The open educator emphasizes individualized learning more than whole-group instruction. This means more flexible use of space, in which students can learn individually, in small-groups, and as a whole class. Interest areas are created. The open educator emphasizes self-initiated and self-directed learning. Books and materials must be easily accessible. The room must permit an easy flow of traffic and accommodate children who need quiet or solitude as well as those who work in groups. The open educator, promoting active rather than passive learning, must have an abundant supply of materials children can touch and manipulate.

The way an open classroom is organized and equipped, then, reflects the teacher's idea of what the curriculum is and should be. Careful advance planning is necessary. While an open classroom teacher must have clear goals and plans, there must be room left in those plans for the children's goals. The teacher must be ready to modify his/her plans on the basis of the children's activities and responses.

There sometimes are no required subjects and no required assignments that students must complete in an open classroom. Generally, there are no examinations or report cards as such. Parents receive detailed accounts of what the student has accomplished. Discipline is also relaxed in the open classroom.

It is evident that open classroom concepts offer maximum freedom for the student's selection of school experiences. In terms of the Edling

classification schema, the open classroom is heavily weighted toward the Personalized Learning and Independent Study Categories.

Schools which have the following characteristics should find the open classroom approach compatible: 1) a preference for humanistic education; 2) parents and staff who are willing to allow children freedom to explore, and to initiate their own learning activities; and 3) resources for buying more *things* for the classroom.

Bloom's Mastery Learning

The Bloom approach to mastery learning was first described by Bloom in 1968 and later expanded upon by Bloom, Block, and others (Block, 1971). The Bloom approach adjusts for individual differences by adding special feedback-corrective techniques to regular classroom instruction and by providing additional learning time for those students who need it. Thus, group-based instruction is supplemented by carefully prescribed individual study for those students who fail to achieve mastery.

The Bloom strategy is based on Carroll's (1963) model of school learning. Carroll contends that most learning tasks in a school curriculum can be mastered by all students if each student is given the time he/she needs. The time needed by a student to learn a school task is viewed as a function of the complexity of the task, the aptitudes and prior learning of the student, his/her ability to understand instruction, his/her perseverance in mastering the task, and the quality of the instruction. Carroll proposes that the quality of instruction depends on such elements as how clearly the learning tasks are defined, how well the materials are sequenced and graded, and how effectively tests are used to provide encouragement, praise, and corrective feedback (Carroll, 1971). Bloom has incorporated these elements into his approach for mastery learning in the classroom.

Since Bloom's mastery strategy is an adaptation of ordinary classroom instruction, it can be used at all grade levels and in all subject areas. Block (1971) has noted that this strategy is most effective in subjects that have fairly stable content, are highly structured, and stress convergent thinking. The following steps outline the main features of Bloom's strategy for mastery learning (Bloom, 1971).

1. The subject is broken down into a series of learning units covering one or two weeks of instruction.

2. The instructional objectives, representing a wide range of learning outcomes, are clearly specified for each unit.

3. The learning tasks within each unit are taught using regular class-size group-based instruction.

4. Diagnostic-progress tests (formative tests) are administered at the end of each learning unit.

5. The results of the end-of-unit tests are used to reinforce the learning of students who have mastered the unit, and to diagnose the learning errors of those who fail to demonstrate mastery.

6. Specific procedures for correcting learning deficiencies (such as using programmed materials and audiovisual aids) and additional learning time are prescribed for those who do not achieve unit mastery. Retesting may be done after the corrective study.

7. Upon completion of all the units, an end-of-course test (summative test) is administered to determine the students' course grades. All students who perform at or above the predetermined mastery level set at the outset receive an A in the course. Lower grades are assigned on the basis of absolute standards.

8. The results of the unit tests (formative tests) and the final examination (summative tests) are used as a basis for improving the methods, materials, and sequencing of instruction.

Bloom's strategy provides for variation in learning time and stresses a uniformly high level of achievement for all students. Learning effectiveness is determined by whether a student achieves an absolute standard of mastery on each unit, rather than by comparing his/her level of performance with that of his/her classmates.

In addition to the methods and materials used in regular classroom instruction, Bloom's strategy requires alternative resources for those students who fail to achieve mastery at the end of a unit. This may take many different forms. Among alternative methods and materials recommended as effective by both Bloom (1971) and Block (1971) are: small group study sessions, individual tutoring, alternative textbooks, workbooks and programmed instruction, audiovisual methods, academic games and puzzles, and reteaching.

If one procedure does not prove successful with a particular learning problem, the student is directed to an alternate procedure. In addition to solving immediate learning difficulties, this approach is intended to encourage students to seek out and use a variety of modes of learning.

Schools which have the following characteristics should find the mastery learning approach compatible: 1) a desire for accountability; and 2) staff commitment for inservice training.

Conclusions

This review has perhaps demonstrated that individualized instruction can and does occur in many forms. While the comprehensive systems have received the most attention, you can individualize only to the extent that there is money, interest, and commitment. One possibility is an eclectic approach using parts of various programs. This eclectic approach is being followed by a large number of schools. Systems such as IPI, IGE, and U-SAIL are serving as prototypes, continuing to contribute to current individualization efforts.

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3

Evaluation of Individualization

Conrad G. Katzenmeyer and Linda J. Ingison

No matter what else may be discussed about individualization, the question that is always asked is: What evidence is there that individualization makes a difference? Understandably, those who have adopted some form of individualization, or may be considering it, want to know what the time, money, and effort required will or should produce.

The thesis of this chapter is that, despite the pervasiveness of this seemingly straightforward question: "Does individualization work?" it is not possible to give a conclusive answer. Not that there is a lack of studies addressing the issue. In a recent ERIC search, we identified over 1,200 entries that dealt with evaluation of individualization. How can it be that a question so intensively studied still remains unanswered? And what do we know about individualization that can guide practice in the schools? It is these questions, rather than "Does individualization work?" that this chapter will attempt to answer.

Our approach will be to look briefly at the types of studies that have been done and to draw some distinctions among them. This will help to explain the nature of the information that has been generated. Then we will look at some areas of individualization that have been of particular interest. Here we will draw on summary or meta-analysis studies rather than attempt to resurvey in these areas. Next we will look in detail at the Instructional Dimensions Study that broadly approached the question of individualization and has implications for the whole area. Finally, we will draw some inferences from these studies concerning what is known about individualization.

Varieties of Individualization Studies

Because individualization is so complex and has so many different meanings, as the chapters by Talmage and Jeter detail, evaluation studies have addressed many issues. While we generally adopt the definition of evaluation as judging the worth of something, evaluation has had to

take on a variety of meanings in these studies. For the first three types of studies—descriptive, analytic, and implementation—we will list only a few representative examples of each as there are far too many to attempt any review.

Descriptive Studies. Many studies have simply been descriptions of what is meant by individualization, or the form it takes in a particular system. For example, Klausmeier (1977) presented the components of the IGE system that includes a summary of some of the evaluation studies that have been carried out. Russ-Eft and Flanagan (1975) described the empirical survey of Project Talent participants that led to the formulation of the objectives and subsequent development of teaching-learning units in Project Plan. Many similar examples could be cited.

Although not evaluative in nature, such articles have provided the background information on which further studies could be based, while clarifying the meaning of evaluation in a given context.

Analytic Studies. A second category of studies carefully analyze a particular approach to individualization, or contrast several approaches with the intent of illuminating their natures, perhaps through the use of different theoretical concepts than the developers used. For instance, Duda (1970) critically analyzed IPI using a systems approach that drew upon both social process and management concepts. Hull (1973) contrasted IPI, IGE, PLAN, and open classrooms using the Edling model, similar to the approach taken by Jeter in chapter two. The work of Walberg and EPIE reviewed in Talmage's chapter are examples of more complex analytic comparison schemes.

Such efforts have contributed a great deal to our understanding of the diversity of individualization approaches, and how we can go about contrasting different forms. Without this degree of detail, it is often impossible to know whether different approaches have similar aims in any but the grossest terms.

Implementation Studies. Because individualization systems seldom are installed easily, particularly when they attempt to be comprehensive, a number of studies have concentrated on the question of how much individualization was actually occurring. Gellman and Woog (1976) developed an individualization (I) survey that indicates degree of classroom individualization. It has been used to indicate changes that occurred in teacher practices over time (Wilson, 1974). Ironside (1973) conducted a national study of the degree to which IGE actually had been implemented in schools carrying the IGE label.

These types of studies have been invaluable in contributing to our understanding of the complexity of implementation. As with other innovations, we cannot judge what impact the program has had, or should

have had, without knowing the degree to which it is actually put into practice. While this now appears to be an elementary, almost trivial, insight, lack of this recognition has made a large number of outcome studies uninterpretable if not "assessments of non-events" (Charters and Jones, 1973).

All three types of studies have contributed to our knowledge of individualization, but they do not address questions of impact. Outcome comparisons are not emphasized in these efforts, if included at all. This is not intended to fault descriptive, analytic, and implementation studies. A case can be made, as we shall see shortly, that we learned more from them than from many of the outcome studies.

Outcome Studies. Studies that have concentrated on the impact of individualization can be classified as having attempted a comprehensive view of systems of individualization, as opposed to those that did a limited or one-shot study of an example of individualization. The former studies have been larger and more expensive, usually supported by federal funds. The latter have been representative of the usual education research study that is more limited in scope and duration.

1. Comprehensive Studies. Given the complexity of many of the individualization systems, an adequate evaluation study must address many issues, and attempt to capture data from a variety of sources. Frequently this must be done longitudinally, to permit time for the system to be implemented and to look for growth in the school setting. We will review three examples of comprehensive studies, and then discuss some strengths and weaknesses of this approach.

One example of a comprehensive study was carried out by the Learning Research and Development Center for IPI (Leinhardt, 1977). Assessment took place in a large number of second grade classrooms across the country during the 1973-74 school year. The data could be compared with similar measurements collected during the two previous school years. Techniques employed were standardized tests, questionnaires, videotapes, and student records. The model employed in organizing and reducing this information will be discussed later in this chapter in connection with discussion of the Instructional Dimensions Study.

Results showed that degree of implementation of the IPI program had increased over years despite a decrease of external support during this time. Indicators—such as percentage of unique assignments, frequency of testing, and the number of cognitive versus management contacts between teachers and students—showed that individualizaton had increased. Placement scores in reading and mathematics had also increased, indicating more cognitive material was being covered. Overall, teachers were observed to have greater confidence with the IPI system,

and to demonstrate more uniqueness of practice within the IPI framework. Predicting achievement, as measured by standardized tests, pretests accounted for most of the variance, but classroom practices contributed a small but stable amount to the final outcomes.

The Wisconsin Research & Development Center for Individualized Learning also is carrying out a large scale evaluation of IGE at second and fifth grade levels (Romberg, 1976). Designed to capture the causal impact of IGE, the study has four phases. The first is a large sample investigation of the degree of implementation of IGE concepts and their relationship to instructional practices, staff outcomes, and student outcomes, using surveys and standardized tests. Phases two and three are small sample studies to permit observation and interview approaches to complement the survey data, and to provide a cross-check on the validity of the self-report information. Another important purpose of the small studies is to assess the degree to which renewal and reform are evident in IGE schools. Phase four is an in-depth study of the curriculum materials associated with IGE.

Results of this evaluation are not fully available yet. Preliminary results indicate greater teacher satisfaction as degree of implementation increases. In addition, previous research has suggested that the IGE system, particularly the multi-unit organization, can be successfully implemented. More positive staff outcomes, such as teaming and shared decision-making, commonly have been found. Increased student achievement has been demonstrated less often, due in part to the fact that curriculum materials were developed much later than the multi-unit organization. In a pilot evaluative study (Katzenmeyer and others, 1976), teachers in a small sample of IGE schools did demonstrate more individualization behavior than teachers in non-IGE schools, but no differences were found in standardized achievement measures.

A third example of the comprehensive study is the evaluation carried out on the U-SAIL system. Prepared for the Joint Dissemination Review Panel of the Office of Education and the National Institute of Education, it emphasized comparisons of U-SAIL and non-U-SAIL schools on standardized measures of reading and mathematics achievement. Five separate studies were carried out: three in Utah, one in Arizona, and one in Georgia. In each comparison, students in the U-SAIL system showed significantly greater gains than those in non-U-SAIL classrooms. In one study, degree of implementation was related to achievement, finding that those classes with high implementation significantly outperformed middle and low implementation classes. Affective measures also have been found to be significantly related to degree of implementation.

Such a brief discussion cannot hope to give more than an introduction to the nature and findings of these studies. It does suggest some of the strengths and weaknesses of these approaches. On the positive side, the comprehensive studies generally involve these characteristics:

- *Multi-school comparisons.* Results are not limited to a single school district or classroom. Thus the generalizability of the findings is much greater.
- *Multi-age comparisons.* Often more than one grade level is included in the study, again increasing the generalizability of the study.
- *Implementation.* The degree to which the program has been put in place is directly investigated, and often the degree of implementation is related to outcome measures.
- *Conceptual framework.* There often is a model that dictates the nature of the relationships to be predicted in the evaluation.

There are also some limitations in these studies:

- *System-specific measures.* Naturally, a study of a specific system of individualization will concentrate on measures that are of particular importance to that system. (This was not true in the U-SAIL study except in regard to the affective measures). This makes it difficult to generalize findings. Most proponents of a particular system would not consider this a limitation as they do not present the system as an all-purpose answer to school problems.

It is necessary to look carefully at the type of measures used to weigh what the effects have been. This becomes particularly critical when experimental-control designs are used, and the measures are relevant strictly to the experimental (individualization) group. For example, student independence or teacher cooperation may not be goals in non-individualized schools. We will have more to say about the measurement question at the end of the following section.

- *Inadequacy of Comparisons.* Many individualized programs are adopted school-wide, even district-wide. This means there may be no existing group to compare the individualized program against. Even where non-individualized classrooms can be found, random assignment of students seldom is possible, often resulting in initial differences among classes unrelated to individualization.

Under these circumstances, comparisons become more difficult to obtain and to interpret. One alternative is to equate or match students statistically, but there often is a lack of background data to do the equating adequately. It also might be possible to compare the results obtained in individualized programs with results from the same school

or classes before individualization occurs. However, this depends on having the same tests given over several years.

Given the problems of finding a reasonable external group for comparison, a commonly used alternative is to compare classes that have shown greater implementation with others showing less successful implementation. While this can be useful, it may be difficult to interpret such findings, as a low degree of implementation may be caused by many factors, and may be symptomatic of other problems. Ultimately, it may be that the only comparison for students in individualized programs is with themselves through pre- and post-measurement, thus having no external comparison. Here, multi-year comparisons become critical to discount "hawthorne" effects, and other changes that are occurring unrelated to individualization.

2. LIMITED, "ONE-SHOT" STUDIES. By far the greater number of outcome studies fall in this category. They generally are done by comparing one group of students in an individualized program with another in a traditional program. We will touch on the review articles that have summarized the outcome studies of individualization in the major content areas.

For example, Miller (1976) reviewed 145 studies that investigated individualization in mathematics, a majority of which compared an individualized approach to a traditional approach. Of these latter studies, 88 included a mathematics achievement comparison and 33 an attitudinal measure. For achievement, 14 of the studies favored the traditional approach, 42 showed no difference, and 32 favored the individualized approach. For attitudes, one study was negative, 25 showed no difference, and seven were positive regarding individualization.

A notable finding was that studies that had been of more than a year's duration showed less favorable results than those lasting a year or less, indicating that original positive results may decay as enthusiasm wanes. In the twenty studies that examined sex differences, no consistent results were found. Retention, transfer, and other factors were also examined, but the number of studies addressing each concern was very small and is not reported here. Miller concluded that the evidence provided some support for individualization, but many important factors remained uncontrolled.

A review of studies of individualized reading was done by Thompson (1975). A total of 51 studies were reviewed, 40 of which had a basal reader group for comparison. Results showed that 24 of the 40 significantly favored the individualized approach, one favored the basal group, and 15 showed no difference.

In science, reviews have been carried out by Royce and Shank (1975) and Marchese (1977). In the former review, 21 studies were identified between 1967 and 1974 that contrasted individualized with group-paced approaches. Most studies found no differences on cognitive outcomes, although four of the 11 that directly examined this outcome did favor the individualized approach, while none favored the traditional. Some of these studies investigated critical thinking and understanding of science. A few studies favored individualization, but most demonstrated no difference. Marchese reviewed only those studies with research designs of high internal validity. He concluded that individualization provides an environment for greater student participation, increased ability for students to evaluate their own performance, more positive attitudes, and at least the same level of subject matter learning as more traditional approaches.

To summarize, there certainly is support for individualization represented in these reviews, although there are grave problems of interpretation, regardless of whether the results are positive or negative. Nevertheless these studies have the advantage of having arisen in a variety of settings and of including a wide range of approaches.

- *Implementation:* For the limited, one-shot study, it is often impossible to know the degree to which individualization actually took place in the experimental condition, or the degree of individualization represented in the control condition. Individualized instruction isn't something mystical, it is an outcome for which many, perhaps most, teachers strive. Only by knowing what actually occurred in the classrooms can one decide how different the individualized instruction was from the previous mode of instruction.
- *Appropriate measures:* The most popular, and by far the most easily recognized measures, are standardized tests. They are published and generally open to scrutiny by everyone. Yet their generalizability may be a weakness in any particular study. A test is useful only to the degree that it reflects what was and what was intended to be conveyed in instruction. The most that can be said for standardized measures in many studies is that they are equally irrelevant to both the individualization and control condition, and may account for the large number of "no significant difference" findings. But more importantly, it is impossible to know how relevant they might be without a careful analysis of the content of the instruments and the instruction. Although this can be done, it seldom is; it is easier to assume the relevance of the measures.
- *Variations in individualization:* Almost every author of a review article has commented on the wide range of programs and practices in-

cluded under the term "individualization." While all have some characteristics in common, the differences have been so great that it isn't clear what the comparison is, or should be. To lump these different programs together makes interpretation difficult, if not impossible.

Evaluation in Selected Areas of Individualization

Recently a number of new studies and reviews have been published in specific areas of individualization. One of these, the summary of aptitude-treatment interaction research by Cronbach and Snow, was summarized in chapter one. Three others are of particular interest.

Meta-Analysis of Studies of Keller's Personalized System of Instruction (PSI).

PSI, or the Keller Plan as it is frequently called, has been used widely in colleges and universities to foster individualization. In PSI, a course is divided into topics, typically 10 to 20, each with its own study guide and assessment instruments. Students move through the units at their own pace but must pass the quiz at the end of the unit in order to move on to the next. Learning to mastery is the goal, so quizzes can be re-taken without penalty until passed. The instructor's role is primarily to give individual assistance, although occasional lectures may be used for motivation and stimulation.

According to Kulik, Kulik, and Cohen (1979), there have been hundreds of evaluations of PSI; the problem is to reach conclusions from the diversity of results reported. The approach taken by these researchers is meta-analysis, which was first described by Glass (1976). Unlike the typical review, where only counts or percentages are reported, meta-analysis takes into account the magnitude of the difference between experimental and control groups. An effect size is calculated for each study, utilizing the means and standard deviations of the experimental and control groups. Effect sizes are summed across the studies and simple statistics (usually *t* tests) are applied.

Kulik and others imposed some additional constraints on the studies included in their meta-analysis. Where data from several semesters was reported, only the most recent was included to eliminate double counting. Also, studies were eliminated where PSI characteristics were lacking in the experimental group, the two groups clearly differed in aptitude, or one of the groups had an unfair advantage in regard to the outcome measure. Using these selection criteria, 75 studies were identified for the meta-analysis.

Results on achievement overwhelmingly favored PSI. Of the 61 studies comparing final examination scores of PSI classrooms to classrooms using lecture methods, only three favored the conventional method, and one found no difference. Effect size statistics were highly significant.

They also found less variation in achievement under PSI (one of the goals of mastery learning) and more positive attitudes toward PSI instruction. No differences were found in withdrawal rates or student study time.

In an attempt to interpret the findings, further analyses were carried out on course characteristics. PSI had a significant effect in physical, life and social science courses; and even larger effects in mathematics, engineering, and psychology. Differences between PSI and conventional instruction were less where the conventional classroom contained some of the elements of PSI.

Overall, Kulik and others conclude that PSI raises the typical student in the typical classroom from the 50th to the 70th percentile; even larger differences were found when retention was examined by repeating achievement tests several months after course completion.

It is interesting to speculate on why outcomes were dramatically more favorable to PSI than to other individualization systems. One reason may be PSI concentrates on a single college course, while other systems have attempted far broader intervention. Also, the measure employed is course achievement, not some standardized measure with unknown relevance to course content. Finally, these studies are all at the post-secondary level, although we will see in the PLATO and TICCIT studies that this alone does not guarantee success.

One caveat must also be raised regarding meta-analysis, which is a limitation relevant to all reviews. A review must draw on published literature, and generally only those studies with statistically significant findings are published. Thus the studies available for review may not be representative of all that have been done.

Evaluation of PLATO and TICCIT

In the late 1960s and early 1970s, the National Science Foundation (NSF) supported the development and demonstration of two major computer-assisted instruction (CAI) systems: Programmed Logic for Automatic Teaching Operations (PLATO) and Time-shared, Interactive, Computer-Controlled Information Television (TICCIT). NSF also supported a large-scale evaluation of these systems, carried out by Educational Testing Service (ETS). This is the largest evaluation of CAI that

has been attempted, so it has become a major piece of literature in this area.

Conceptualization of the two computer-based learning systems was quite different. PLATO is centralized; until recently it was operated totally from the University of Illinois. TICCIT is decentralized, depending only on the local computer. PLATO is designed to be an adjunct to classroom instruction; its exercises, drills, and games not intended to be a full course of instruction. TICCIT is designed to provide all of the instruction that would otherwise be given through classroom lectures. However, both systems do seek to individualize instruction by providing a variety of materials to match the needs of the student, and by offering immediate, non-judgmental feedback on performance.

Both PLATO and TICCIT developers chose to demonstrate their system at the community college level; in addition, PLATO also had a demonstration in the elementary school. PLATO materials were developed for five subject areas at the community college: accounting, biology, chemistry, English, and mathematics; and for reading and mathematics in elementary school. TICCIT materials were developed only for English and mathematics. PLATO was implemented at four community colleges, TICCIT at two. Each system was implemented in a large number of courses, with many sections. The PLATO elementary school demonstration was at kindergarten and first grade for reading and fourth, fifth, and sixth grade for mathematics, but was considerably smaller than either of the community college demonstrations.

Data collection occurred over two years, in both computer based and traditional classes. The conclusion from the community college demonstrations was that PLATO and TICCIT had been successfully implemented in these schools. The PLATO elementary school implementation was less successful, particularly in reading, where course materials were found to be unsatisfactory.

Results at the community college are clear-cut. For PLATO (Murphy and Appel, 1977), there were no differences shown on attrition or achievement. These findings were the same across all subject areas. Students were favorable to computer-assisted instruction, but there were no differences in attitudes toward instruction in general. Staff of the community colleges were very favorable to PLATO; they intended to continue with the system after the demonstration, although most said it had not saved them any work, and approximately one-third said it had created more work. Murphy and Appel suggest that the reason the staff at the community college was so supportive of PLATO was they were actively involved in implementing and using the system. Since PLATO

was an adjunct to regular instruction, instructors could use it as they preferred.

Results from the TICCIT evaluation (Alderman, 1978) are quite different. Course completion rates for students enrolled in TICCIT classes were significantly lower than in lecture classes (16 percent *vs.* 50 percent in mathematics, 55 percent *vs.* 66 percent in English). Rates did not improve when tracked across semesters for individual students. TICCIT students did not withdraw more frequently; they simply didn't complete course requirements. Of those who completed the course, there was evidence that TICCIT students achieved more, particularly those who began the course with a stronger subject matter background. Such effects were larger in mathematics, but were also found in English.

Student attitudes generally were less favorable toward TICCIT than lecture classes due to the perceived lack of personal contact with the instructor. It was clear that student attitudes depended on the role that TICCIT and the instructors played. Staff attitudes also showed a mixed pattern of responses, with many faculty being uncertain about the impact of the TICCIT program. Despite marked changes in their activities, they were less certain that CAI and TICCIT would help them meet their instructional responsibilities.

For the PLATO elementary school study (Swinton, Amarel, and Morgan, 1978), there were significant achievement results favoring students in PLATO mathematics classes at all three grade levels. The pattern of findings across varied measures of achievement differed by grade level depending on the match of the PLATO materials to student backgrounds and needs. Attitudes also were favorable, but differences were not as striking as with mathematics achievement. The students found PLATO fun, but felt they learned more math from their teacher than from PLATO.

In reading, there was a significant negative impact of PLATO at kindergarten and grade one (the two grades included in the reading study). This probably was due to the disruption of students at this age caused by the presence of the PLATO terminal in the classroom.

Case studies carried out by ETS in both reading and mathematics demonstration classrooms point out the difficulties in attempting to interpret these findings, however. There were wide variations in the way the PLATO terminal was used in each classroom. Some teachers tried to integrate PLATO into their instruction; others used it as a totally separate activity. Given the problems in monitoring what each student is doing on PLATO, it is clear we still have a great deal to learn about the most effective ways to use this as an instructional adjunct in the elementary classroom.

Summary

While it is difficult to reach simple conclusions in large and diverse studies as these, it is clear there was no overwhelmingly positive evidence to support either PLATO or TICCIT. Disregarding the considerable cost of these systems, the positive outcomes were not sufficient to recommend these systems as they existed for these studies. This has been confirmed by Kulik, Kulik, and Cohen (1979) in a meta-analysis of computer-based college teaching. Drawing heavily on the PLATO and TICCIT evaluations, as well as a number of other studies, they conclude that "recent computer applications have made only a small contribution to the effectiveness of college teaching."

There are mitigating factors. The ETS evaluations occurred when courseware was under development. Development of top quality computer-based instructional materials is more of a challenge than it originally was believed to be. In addition, the community college may not be the best level to demonstrate these systems. This argument was made specifically by Alderman regarding the TICCIT system because of problems of course completion.

Assessing PLATO also is very difficult because it is a "weak treatment"; use is generally voluntary and the extent of its use by students varies greatly both within and across classrooms. The amount of time spent on the PLATO system by some students was so small that no effect could be expected. The probable reason for its effectiveness in elementary mathematics, where usage time was more prescribed and monitored than in the community college was that it increased the amount of instruction time for math, but with unknown costs in time devoted to other subjects.

Evaluation of the Open Classroom

Of all types of individualization, it is probably fair to say that the open school, or open classroom, has proven the most difficult to evaluate. The nature of the innovation differs greatly across settings, the outcomes are both global and diffuse, and many of the proponents oppose any evaluation except that which immerses the evaluator in the classroom. This has led to a number of in-depth case studies, but few comparative studies.

Nonetheless, there is a substantial number of studies of the open classroom that have recently been summarized by Horwitz (1979). Horwitz points out that the term "open classroom" is used in two quite different ways. On the one hand, it refers to "open education," a set of

beliefs and attitudes that encourages flexibility, diversity, and greater student control of learning. On the other hand, it may simply refer to "open space," an architectural innovation that may or may not be accompanied by individualized instruction. The degree to which instruction reflects the open classroom philosophy is not always clear in these studies.

Despite these problems, the open classroom has been a significant movement within individualization. Horwitz summarized several hundred studies, classifying them according to the outcome measured. For educational achievement, results are inconclusive. Of 102 studies contrasting open with traditional classrooms, 14 favored the open classroom, 12 the traditional, 29 showed mixed results, and 47 demonstrated no differences. However, it is fair to say that the data support belief that the open classroom is equally as effective as the traditional classroom in fostering achievement.

For affective outcomes, the results are more favorable to the open classroom, although a majority of the studies show mixed results or no differences. Greatest effects found in the open classroom were on independence and cooperation: in over two-thirds of the studies, the open classroom was found to be superior, while none of the studies found the traditional classroom superior. Large differentials favoring the open classroom also were found for attitude toward school, creativity, and curiosity. Less clear were findings on self-concept, anxiety and adjustment, and locus of control.

In summarizing these results, Horwitz points to the serious problems of measuring many of these variables, and the need for more descriptive studies of the instructional processes, as well as the use of evaluation approaches that provide more comprehensive assessment of effects. However, he feels that additional studies will probably not influence the political decision of whether to retain or eliminate open classrooms. There are those who like open classrooms and those who don't; studies are unlikely to be conclusive enough to change the beliefs of either faction. It is worth underscoring Horwitz's conclusion, because it probably applies to almost all forms of individualized instruction.

The Instructional Dimensions Study

Unlike previous examples, the Instructional Dimensions Study (IDS) arose out of a Congressional mandate to the National Institute of Education (NIE) to assess the effectiveness of the nation's compensatory education (CE) programs. A matter of particular concern for Congress was

"an analysis of the effectiveness of methods and procedures" used to provide compensatory education (NIE, 1977).

Such "methods and procedures" were, in a number of cases, forms of individualization. The broad goals of compensatory education programs often were translated at the local level as any form of instruction that was offered exclusively to CE students and comprised a specified portion of the CE student's day. The practical result was that CE was frequently individualized. Some of the most successful CE programs shared several characteristics with more formalized, individualized instructional programs. However, the sheer diversity of CE approaches forced NIE to initiate the effectiveness study of individualized instruction for CE students in a novel manner.

Planning for the IDS was begun via a request for proposals (RFP) in two phases. The first was designing a study that could assess effectively the degree and success of individualization in a variety of compensatory education settings. The second was for implementation of the winning study design. Specifically, the design RFP specified a series of important questions related to individualization in compensatory education (Kirschner, 1977):

- "What is the relative effectiveness of various forms of individualization? Individualization is defined by a number of dimensions, including:
  a. The assignment of specific learning objectives or activities to individual children;
  b. The use of diagnostic and prescriptive activities;
  c. The existence of alternative learning paths and sequencing for individual children;
  d. The use of individual or small group pacing.
- How effective are well-implemented individualized programs in raising achievement in reading and mathematics of educationally deprived children?
- What is the effect of well-implemented individualized programs on the classroom and school environment?
- Does individualization provide effective instruction for Title I students as well as regular students without any elements of stigmatization?"

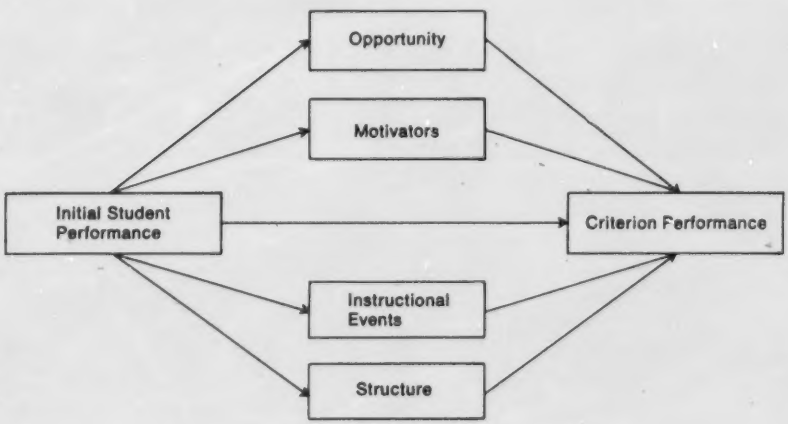
The winning design was submitted by the Learning Research and Development Center (LRDC) in Pittsburgh. The LRDC design was distinguished by the use of the Classroom Process Model (CPM) developed at LRDC (Cooley and Leinhardt, 1978). The CPM, given in Figure 1,

identifies several constructs that are assumed to account for the variation in performance among classrooms after a stable and lengthy period of instruction in those classrooms. The four constructs of the CPM are: Opportunity, Motivators, Instructional Events, and Structure.

These constructs, along with initial student performance, are assumed to primarily determine criterion performance. Although the CPM does not specify the exact nature of the behaviors entering into any one of the four constructs, it assumes a functional relationship among the constructs and criterion performance. The strength of the CPM in assessing CE was that it utilized, as explanatory constructs, groups of behaviors often used or encouraged in individualized educational programs. Additionally, the CPM could be used in the existing variety of CE settings.

The IDS, implemented by a consortium of LRDC, Kirschner Associates Inc. (KAI) and Education Turnkey Systems (ETS), was a one-year field study involving 14 school districts in five states. Four hundred classrooms, 200 first grade and 200 third grade, from 100 different schools were sampled to represent a variety of degrees of individualization, socioeconomic status, and instructional settings for compensatory education (i.e., instruction within regular classroom setting or in "pull-out," separate settings). The IDS focused on reading and mathematics achievement in the study sample. The California Test of Basic Skills (CTBS) was chosen as the criterion test, and administered at the beginning and end of the study.

Figure 1. Classroom Process Model



For the purposes of the study, the Classroom Process Model was adapted to the Instructional Dimensions Model (IDM) (Fig. 2). Opportunity refers to the amount and quality of instructional time received in a subject. The Opportunity construct was defined in terms of overall time spent in reading and math, as well as the degree to which the material taught in class overlapped with that covered by the CTBS in each subject area. The Motivator construct included both curricular motivators such as interest, variety, and difficulty of the subject matter materials used, as well as those interpersonal motivators derived from positive interactions with teachers or other students. The Instructional Events construct included measures of teacher management and cognitive statements to the whole class (or a portion thereof), in addition to measures of the quality of such interactions. Individualization included a variety of measures such as methods of initial student placement and progress throughout the year, grouping, and pacing practices. The IDM included three additional elements: teacher background, cost of program used, and setting (regular classroom CE instruction or pullout instruction).

Data collection included interviews with teachers, principals, and district program coordinators; student attitude and achievement data; and videotaping of selected classrooms. Additionally, teachers, principals, and district personnel recorded information relevant to study measures at intervals throughout the year.

The various measures pertaining to each of the four IDM elements (Opportunity, Motivators, Instructional Events, and Individualization) were grouped via methods described in detail in KAI, 1978. The method of analysis of data used was commonality analysis, which allocates a weight or proportion of the explained (significant) variation to each of the predictors of the IDM.

Overall, the IDS provided no clear evidence that individualization was superior to other approaches to instruction in reading and math at the first or third grades. What variation was obtained could be explained by pretest performance and intervening variables unrelated to individualization. However, two major caveats must be added to this finding. First, the measures of individualization used in this, and other, studies are not yet developed to the point that we know we are measuring all behaviors important to individualization. Second, the IDS sample showed that some individualization processes were operating at a level far below that which is either demonstrably or theoretically possible. Therefore, certain processes measured in this study may not have been fully, or sufficiently, implemented.

While there was a lack of significance overall, certain of the con-

Figure 2. Instructional Dimensions Model

Opportunity	Amount of Time (actual time in school plus classroom stability, attention, and such other factors)
	Curriculum Overlap (overlap of material taught with CTBS)
Motivators	Curriculum Motivators (interest in, variety, and difficulty of material)
	Interpersonal Motivators (degree of encouragement from teacher, self-management, peer instruction)
Instructional Events	Management Information (frequency of teacher management statements)
	Cognitive Teaching to Individuals (frequency of cognitive statements to individuals)
	Cognitive Teaching to Small Groups (frequency of cognitive statements to small groups)
	Cognitive Teaching to Whole Class (frequency of cognitive statements to whole class)
Individualization	Matching by Pretests (procedures used by teacher to place students at beginning of year)
	Matching by Mastery (presence of mastery tests to determine overall learning)
	Testing Practices (frequency of tests, individual differences in tests, and such other factors)
	Assignments and Grouping (procedures used to assign to groups, size of groups)
	Alternative Learning Routes (procedures used if student had problems with material, reliance on management system)
	Sequencing and Pacing (self-pacing degree, variation in sequencing)
Teacher Background	Teaching at Same School (years at school)
	Formal Education (years of education)
	Recent Training (or professional involvement)
Cost	Program Cost
Setting	Pullout or Regular

structs were related to performance in one or more of the four study subsamples. The Opportunity construct was the most powerful of the four IDM constructs in predicting criterion performance in both first and third grades. However, the strength of this result in comparison to the other strong predictor, Pretest Performance, varied across grades and subjects. While Opportunity was important, the amount of time allotted for instruction on a particular subject had little effect on achievement. This was true when analyzed as total allotted time and when time spent on task was emphasized in the analysis. These results indicate that the content and/or process of instruction is more important than simply time spent.

Evidence also indicated that assessment of mastery was positively related to achievement gain in the third grade. Further, the methods of mastery assessment used (for example, testing, curriculum-provided assessments, or class assignments) were all equally effective. This may indicate that such assessments may serve to focus the students' attention on mastery of the material at hand and/or that third grade performance is enhanced when advanced topics are only attempted if the student has mastered more elementary ones.

While emphasizing mastery learning is positively related to achievement gain, involving students in management processes was negatively related to student performance, except in first grade math. Apparently too much of such extra-curricular information serves to distract students from the content itself.

Finally analysis of measures of instructional quality yielded the finding that classroom techniques such as referring to earlier performance, referring to earlier materials, focusing the student's attention on the task, and effective classroom management, are most related to high quality instruction and to achievement gain.

The implications of these findings are that students will benefit from high quality opportunities to learn, which are characterized by an emphasis on content/direct instruction and a high degree of articulation with past topics/mastery. While instruction having these characteristics need not *necessarily* be individualized in nature, it is probably true that individualization would facilitate it.

In sum, although the IDS showed no clear superiority of individualization over other instructional approaches, there were tantalizing indications that classroom processes often associated with individualization had some part in explaining the findings. On the other hand, although the IDS represented an advance in both theory and method, we are still searching for more appropriate variables, measures, and means of

analysis which will provide definitive answers about the worth and effectiveness of individualization.

Conclusions and Recommendations

We hope our review has demonstrated why the question, "Does individualization work?" is far too broad and complex to address; the answer inevitably is yes and no. What do we mean by individualization? What do we mean by working? Only as we narrow the questions can we hope to achieve some reasonable answers.

Does this mean there is nothing we can conclude about individualization? Not at all. The research and experience with individualization over the past decade and more has a great deal to tell us.

1. *Does individualization change classrooms?* Yes, an almost universal finding is that when individualization is well implemented, the schools are different. The environment does become more sensitive to individual differences of students, and both staff and students generally are more satisfied. But this happens only when individualization is truly tried; simply adopting a label, or a new schedule, or some different materials, won't necessarily change anything.

2. *Is individualized instruction a great deal of effort?* It can be, and often is—frankly, more than some staff members are willing to put forth. We know a number of instances in which staff members have been "burned out" attempting to practice individualization. The problem is greater when a whole school attempts to individualize, or when a number of subject areas are individualized at once. But even the simpler approaches, such as organizing instruction by objectives for a single class or subject matter, call for additional effort.

3. *Does individualization increase the amount of record-keeping needed?* Inevitably, individualization requires knowing more about the students, regardless of the system employed. Lack of individualization never was due to disinterest on the part of teachers; they simply didn't have the time to follow every student, or the materials and procedures to collect the information any other way. But having the potential for gathering more information requires more recording and interpreting if it is to be used. And no completely satisfactory solution has yet been devised for addressing this problem. Perhaps in the future the computer will be able to do much of this, but as yet, we have only partial solutions.

4. *Do students achieve more under individualized instruction?* As we have indicated several times, this is a very difficult question to answer

as it must be related to what actually occurs in the classroom and how we go about measuring achievement. Certainly there have been many examples of achievement gain when what is tested reasonably reflects what has been instructed; for more generalized measures, the results have been less positive.

One conclusion seems quite certain, however. There have been very few instances in which students in individualized classes have done less well than those receiving traditional instruction. The finding of "no difference" is often interpreted in a negative manner, but this isn't necessarily true. There are many potential benefits from individualization: the staff may be happier in their jobs, or students may be more positive about their educational experiences. These are worthwhile outcomes, and the evaluations argue that these can be obtained without sacrificing achievement.

5. *Is individualization really worth the effort?* This is the bottom line, and it can only be answered by the individual school or school district. Many schools that have individualized say it is worth it. Many who have not tried it, and some who have, will say it isn't. This question is particularly critical now when individualization has ceased to be the "hot" innovation it was several years ago. While we cannot provide the answer for the local school or district, we can give some suggestions about what should be considered.

- Recognize that individualization isn't an either/or decision. As this book has tried to make clear, there are many varieties of individualization, from examples only slightly different from traditional practices, to revamping of the total school program. While the comprehensive systems have received most attention, you can individualize to the degree that money, staff interest, and community attitudes permit. Perhaps it is the adoption of objective-based materials in a single subject, or sharing instruction across classrooms for students with common needs, or development of better assessment measures for knowing how well students are progressing. Or perhaps it is considerably more. One thing is clear; there is no one right way to individualize, or one that is guaranteed to be successful.
- Select the kind of individualization that will do what you want to do. If you want greater student achievement, then look for a system that will help you relate instruction to assessment, and allows you to concentrate on those areas where achievement problems exist. If you want more shared decision-making among the staff, select a system that will define new relationships and help staff to make these decisions. Don't search for the solution until you have identified the problem.

• Regardless of your choice on individualization, the IDS study suggests it will be helpful to maximize attention to mastery of the material, or otherwise focus the student's attention on the task, and refer to earlier performance and materials. Teachers should practice effective classroom management while minimizing the students' involvement in management. While instruction having these characteristics need not be individualized in nature, it is probably true that individualization will facilitate it.

• Even if you decide to institute a major change, don't try to do it all at once. Careful preparation and phased implementation is likely to be more effective than a single crash adoption.

• You can't individualize without evaluation. You need information on initial individual differences and what progress you are making. But this doesn't mean that evaluation has to be fancy or expensive.

Decide on your evaluation needs before you start individualizing. This should include evaluation of individual students as well as the overall program. Seek local evaluation assistance early in your efforts. Don't be caught needing information from last year's third graders for comparison purposes when those students are already fourth graders.

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4

Guidelines for Local Decision Making

James R. Larson

As local decision makers search for ways to meet individual needs of students, they must consider local conditions as well as the attractiveness of various alternatives. This chapter lists questions for reflection and offers practical guidelines to teachers and principals for implementing individualized programs.

Which Approach?

A critical decision is whether to adopt an existing approach, such as those described in chapter two, or to attempt to develop a program locally. Existing programs are inviting because:

1. They can be seen in operation either in actual school settings or through well-designed audiovisual presentations.
2. They may have developed curriculum materials that make implementation easier.
3. They may have been learner-verified and field-tested and can provide evaluation results before implementation in your setting. (Internal projects can be evaluated only after they have been implemented.)
4. The names, terms used, and reputation of existing programs are better known and may provide short cuts in communicating the type of individualization involved. (Local developers may have to struggle with defining, describing, and communicating their program and its objectives.)
5. Knowledgeable and articulate consultants, and well designed in-service packages, may be available.

However, local projects also have advantages:

1. They may be better suited to the local situation.
2. They have great potential for producing a feeling of ownership among staff members.

3. They may be started in a small way, allowing for revision and refinement as development proceeds.
4. Start-up costs may be lower.

The time saved by adopting an existing model may be more than offset by the necessity of making certain it fits the local situation. Sometimes a program will not blossom in a different environment no matter how carefully it has been transplanted.

Saylor (1974) commented, "The most serious gap between the theory and practice of curriculum planning occurs as local planning groups adopt, without study and adaption, specific plans made external to the school center and population concerned" (p. 36). The key words are "without study and adaption." Careful study and adaption to local needs will contribute in a positive way to successful implementation.

If the decision is to choose an existing approach, the question remains which one? Among factors to be considered are:

1. *What is the philosophic position on which the program is based?* The change process is difficult enough without the added task of changing one's philosophic base. Such a change is not impossible and may even be desirable, but one should be aware that a program with a similar base has greater likelihood of success. Implementation which ignores a possible philosophic shift may run afoul of reality.
2. *What is the acceptance level of your community?* Does the proposed program have a good chance of being accepted and winning continuing support from the various publics of your community? You may decide to push for a program even though it faces opposition, but consider whether the disequilibrium that results will be beneficial to students in the long run. Make certain you have a feel for what your community expects from its schools.
3. *What is the acceptance level of your staff?* While there are ways of moving a school staff from one position to another in positive steps, it is important to have a sense of their previous experiences with change efforts.
4. *Can the program be adapted to your local situation?* What is the program's potential for adaptability? Is it a total system or will separate parts function in your setting?
5. *What student grouping patterns are called for?* As explained in earlier chapters, individualized instruction does not require that students always work alone. If they always study independently, chances are high their needs will not be met. A learner may be part of the whole class, be in a small group, and work independently all within one class period.

6. *Is evaluation data available?* Examination of evaluation data is a must. Seek out studies made by agencies external to the project as well as those sponsored by the project. When examining the studies, consider not only "Does it work?" but also "Can it work in my situation?"

7. *Do existing staff members assume new roles?* Assess exactly how much change in roles is required. What will it take to bring it about? Special staffing patterns are not always necessary to individualize instruction, but certain forms of individualization may be enhanced by differentiated staffing patterns.

8. *How much and what type of inservice activities are required?* Can staff development be provided by local consultants, or are consultants from the project a necessity? Are the economic requirements of inservice fully understood?

9. *Are additional personnel needed?* Some programs need additional personnel in the classroom to operate as the designers intended, but added staff is not an absolute requirement for moving toward individualization. Beware of trying to support long-term personnel requirements on short-term financial resources.

10. *Does the program have curricular compatibility with elements of the local program that need not be changed?* Will all the pieces fit together? An assumption often made, and just as often wrong, is that improvement in curriculum content is a natural consequence of individualization. Breaking something down into more manageable pieces for learner digestion does not automatically improve its basic components.

11. *Are new curriculum materials needed?* Does the proposed program require significant alterations in curriculum materials? Individualization of instruction does not mean that a unique program of instruction must be designed for each student. Students may operate with a variety of materials.

12. *What are the costs of the program?* There is only so much money available in school district budgets for direct support of instructional programs. Determine if the proposed program will detract from the economic support of existing programs.

13. *Is a computer or other equipment needed?* This question goes to the center of decision making: allocating resources by priorities. Do your priorities include acquiring high-cost equipment? Do you have financial resources?

14. *What support services are required?* Does the project both require and provide necessary support services?

15. *Are architectural changes necessary?* Be aware of physical facilities requirements. The allure of a proposed program might be associated with an attractive setting quite unlike the local one.

16. *What is the time needed for implementation?* Based on an assessment of local needs, how much time will it take for implementation? Are there alternative routes and time schedules to successful implementation?

Implementation

While educators are well aware of individual differences, they often encounter difficulty putting individualized programs into practice. The findings of Project TALENT, reinforced by the follow-up study conducted by Flanagan (1975), indicate many staff members lack the resources, skills, or both to diagnose student needs, prescribe instruction, and evaluate its effectiveness. Wilson (1974, 1976) found that teachers exhibited minimal ability and desire to individualize instruction.

The following guidelines are addressed to those most in a position to individualize education: the principal and the classroom teacher. There is an essential difference between the two; a teacher may initiate direct moves toward individualization without the involvement of the principal, but the principal cannot directly affect the classroom environment without working through a teacher. This is not to say that one can do without the other; a system can crush a teacher who decides to go it alone in the face of open antagonism from administrators or colleagues. (This presents a strong argument for having an ongoing change support system in place.)

Basic to any commitment to alter the status quo is assessing your personal abilities—be you principal or teacher. Review previous experiences with change—were they successful? Do you realize the complexity of the tasks involved? Are the assumptions concerning the new approach personally acceptable? Answers to such questions will help you assess the strength of your personal readiness and abilities, and point out areas that may need reinforcement.

Guidelines for Principals

Organization of Resources

Principals need to consider four types of resources: time, money, staff, and support. Without careful attention to these supportive resources

and their allocation according to meticulously drawn plans, the disaster potential increases with each unplanned step.

I. TIME

A. *Establish a goal-oriented sequence of events.* There are a number of project planning methods available. Using them, arrive at a sequence of events for the project with definitions of time, responsibility, and resources needed that should result in short-term, obtainable results. Staff involvement in constructing the sequence of events contributes to their understanding of the scope of the undertaking.

B. *Do not rush into the project without enough lead time.* The more time spent in planning, sequencing events, acquiring resources, and preparing staff, the better are the chances for successful implementation.

C. *Hold short planning sessions with specific intended outcomes.* A higher sense of accomplishment may be achieved with more frequent meetings that are short, to the point, and result in decisions reached and responsibilities assigned.

D. *Explore the possibility of forming an administrative team with another interested principal.* The benefits associated with team teaching —colleague reinforcement, efficient use of time, and the like—also result from two principals working together to implement a program in two schools or portions of schools. Strengths and needs in administrative abilities and instructional knowledge may be balanced out with this approach.

II. MONEY

A. *Determine the long and short term costs of the project.* Financial forecasting should be part of project planning. It is unwise to enter into a project without estimating annual costs. A one-time allocation of money may lead a project down the road toward implementation, but leave it short of money eventually. If one-time sources of money are available, use them only for one-time costs.

B. *Seek out research and development funds.* Encourage the central administration and board of education to establish an account for special projects. This funding of curriculum development should be a regular function of the district's curriculum support. The existence of such an account can serve various needs, and principals will not have to plead repeatedly for specialized funds. An alternative is giving control of the account to a district-wide representative curriculum council. By using established procedures for granting funds to applicants, the district staff demonstrates support for an organized change process.

C. *Re-allocate existing budget accounts.* Practitioners who have undertaken various plans of individualized instruction find there is less

need for annual textbook replacement and more need for other types of supportive curriculum materials. Alter budget planning accordingly. Explore an incentive system that rewards staff for infrequent use of substitute teachers. The money not used for substitutes can be transferred into the school's instructional supply or other supportive accounts.

III. STAFF

A. *Diagnose staff readiness for change.* This crucial step can be likened to assessing the skill level of a student prior to any learning experience. To remain consistent with the concepts associated with individualization, the approach to staff development should account for individual differences among staff members.

B. *Address staff needs with learning experiences based on the same principles as those used with students.* DeBruin and Cooke (1978) developed an "Onion Construct for Individualized Inservice" which treats teacher needs as one would student needs. A survey instrument, designed to assess teachers' levels of development through successive layers to the inner core, is administered. The outer ring of the onion concerns itself with room arrangements. This is followed by rings for instructional strategies, goals for teachers and children, and professional beliefs and values, to the inner core of personal beliefs and values. Based on the results of this needs assessment, teachers are placed in inservice groups with colleagues who indicated similar needs.

A feature of the plan is that teachers also indicate topics on which they would lead inservice sessions. It is DeBruin and Cooke's position that teachers are generally most interested in their own growth when they are actively involved in the planning, implementation, and evaluation of inservice sessions. Individualized inservice aided by local teacher consultants has potential for increasing the legitimacy and ownership of a newly introduced program.

C. *Involve the staff throughout the entire process of planning and implementation.* A change in the status quo will be facilitated if those who have to do the job and make it work feel a sense of ownership in the undertaking. Chances for success appear to be greater if the desire for change is based upon intrinsic motivation as opposed to extrinsic directives. It is Moore's (1976) thesis that "One should expect the dominant resistance to change today to emanate from those over whom power is being exercised" (p. 33). Using the results from the staff needs assessment described above, the various tasks associated with implementation need to be carried out by the teachers. However, do not just "allow" the staff to carry out tasks assigned by the principal; have teach-

ers deeply involved in the decision making that produced both the list of things to be done and the list of persons best suited to carry them out.

D. *Aid the staff in their professional growth.* In addition to providing local inservice sessions, encourage teachers to attend regional, state, or national conferences. Arrange for them to visit exemplary schools. Collect and disseminate pertinent literature. Activities such as these serve to provide common understandings of the tasks involved and the solutions suggested.

E. *Give the staff credit in public.* Do not have the project become the principal's project; it must be the staff's project. Public recognition contributes to feelings of ownership.

F. *Recognize the possible new roles staff members may have to assume.* Be empathetic and knowledgeable about the changes required of staff members. The principal's role as "principal teacher" should come into play as other staff members undertake changes in activities and roles. Consider doing some teaching yourself. By working with a group of students on a regular basis, you will experience some of the feelings and difficulties your staff will be experiencing.

G. *Involve staff members in the staff selection process.* Selection of new teachers is an important task at any time, but especially when a staff is in the process of implementing or operating a program of individualized instruction. Have applicants take the assessment instrument used by present staff members. Attention both to filling needs of a particular classroom situation and to complementing strengths and weaknesses of the present staff can reinforce the project.

IV. Support

A. *Solicit the support of central office administrators.* Just as a principal must support and encourage teachers, so must the administrators in the central office support and encourage building principals. Arrange for appropriate central office administrators and supervisors to attend inservice sessions and planning meetings. Solicit not only their support, but also draw upon their areas of expertise and interest. Include them as a part of your project team.

B. *Gain approval and support from the board of education.* Having a supportive board of education behind a project is of immeasurable value to the principal and staff members. Invite the members of the board to visit the school for the express purpose of talking with staff members involved with project planning. A school parent group might invite the members of the board to a joint meeting to discuss the project. Following

district procedures, keep members of the board of education informed of progress and success on a regular basis.

C. *Build ownership among parents.* Every reasonable effort should be made to involve parents in plans for the project. Survey parents to locate those who can help. While extensive use of parents and citizens is important, be careful not to rely so heavily on them that the program will fail without their help. Families move, children are promoted, and interest can wane. Continued recruiting is necessary.

D. *Communicate progress on a regular basis.* Keep parents, teachers, and administrators informed of your progress. Time such communications so that specifics can be reported. Concentrate on minimizing differences caused by the new program, and emphasize benefits to students.

E. *Provide for evaluation from the beginning.* As objectives are developed, develop measures to assess their success at the same time. Evaluation should produce data for decision making at regular intervals. Avoid concentrating only on the discrepancy between desired and actual outcomes and overlooking aspects that are going well. Reinforce successes as well as correct deficiencies.

F. *Realize that the planning group may move ahead of the rest of the staff.* A danger in working with only a small planning group—no matter how representative—is the tendency for them to move into the project faster than those they represent. Decisions made by a planning group which has not communicated well with those they represent may be rejected. Communications about the project must be shared with all members of the staff on a regular basis. Report to the staff in meetings, through short informative notes, and by posting a chart of the project's progress through its objectives and timeline.

G. *Start with small, manageable problems.* Choose a recognized problem to work with to reinforce the postive aspects of change. Change what you are able to change, such as resource center operations, space requirements, time schedules, and parent programs; move into other areas after it has been shown that change can be accomplished. Problems should be manageable, but they must contain some elements of difficulty in order to demonstrate that the process can work.

Curriculum

Curriculum development should proceed according to a logical, orderly plan.

A. *Ascertain if sound curriculum development practices and procedures are in place within the district.* Existence of a planned curriculum

development cycle within the district will help support change involved in the project by recognizing forward movement as a natural thing.

If there is no district plan, establish one for your school. By following a carefully structured curriculum development cycle, members of an institution know what to expect and are not overwhelmed with too many changes at one time.

B. *Work first with an easily structured part of the curriculum.* Practice the techniques of individualization on a portion of the curriculum that is easily structured and built on a sequence of skills. Move to other portions of the curriculum only after the techniques involved have been practiced and refined. First efforts should concentrate on polishing techniques rather than on reordering curriculum content.

C. *Consider the project's effect on articulation between the grade levels.* Make certain that organizational levels above and below are aware of the objectives and techniques of the project. Be concerned with articulation of both content and method. Involve teachers of grade levels above and below the level or levels at which the project will operate. Avoid building a program that may become an island.

D. *Develop goals and objectives which hold meaning for all publics involved.* Goals and objectives of the project should be presented in such a way, and in such vocabulary, that they are clearly understood by parents, teachers, and where applicable, students. If the intent of the project is not understood, support for it may be weakened.

E. *Design the project with a logical sequence for expansion.* Successive steps in the development of the project should occur without requiring excessive new training of the staff, or alterations in the understandings presently held by the staff. Progress from one step to another should build upon the work that has gone on before, not on extensive remodeling.

School Environment

The environment within the school is a critical element in the process of project implementation. Wise use of supportive resources and logically planned curriculum development will suffer and wilt in an unhealthy atmosphere.

A. *Know the history of local innovation attempts.* Do not plan as if this project were the first attempt at change ever made in the district or building. Become aware of not only the roots of the concept being planned, but also of the history of the change process in the local setting. How have previous attempts at the introduction of new ideas fared? As

a noted historian has put it, history does not repeat itself, if only because the participants in the second round of any experience are aware of the outcome of the first. Make certain you have this awareness.

B. *Encourage a climate for success.* Constant attention to developing ownership of the project, honest and open communications, understanding of mistakes, reinforcement of staff efforts, and a planned program with few surprises will all contribute to a climate in which risks may be taken with minimal threat to the personnel involved.

C. *Understand that the project will be more acceptable after some successes have been experienced.* It is natural for staff members to wait to see if things are going to work out as planned and promised. This is all the more reason to start with small manageable pieces in order to show success early in the project.

D. *Keep the major goals of the project in mind.* Recognize that day-to-day operations may become so overwhelming that the staff may lose sight of the major goals of the project. Charted progress on the planned sequence should be recorded and communicated prominently.

Guidelines for Teachers

Organization of Resources

I. TIME

A. *Establish a goal-oriented sequence of events.* Anticipate the steps necessary to reach the objectives of the project. Place them in a logical order, determine the resources needed, and estimate a date for completion of each. It is important that you know where you are going, how you are going to get there, and how you will know when you are there.

B. *Anticipate how the project will reorder day-to-day allocations of time.* Work at establishing the time requirements of the project as opposed to the way daily time is presently allocated. New activities should take the place of existing activities and not be in addition to them. As an example, record-keeping of student progress can be done by the students themselves with the data confirmed (initialed) by the teacher.

II. MONEY

Examine financial resources. Following the familiar admonition to start small, begin with activities that can be accomplished with existing resources. Requests for additional funds tend to be accepted more readily when successes can be shown rather than promised.

III. Materials

Provide for efficient management of instructional materials. The Annehurst Curriculum Classification System (Frymier, 1977) offers a method of matching a student's current educational needs with the materials on hand. It provides for classification of curriculum materials by subject matter but also in terms of what is known about individual differences.

IV. Support

A. *Recognize the formal and informal power structures within the school district and school building.* In any change effort, there is great potential for resistance on the part of those affected. It is important to convince and enlist those with power so they do not become resistors. This includes other teachers, building and central office administrators, parents, and members of the board of education. Recognizing potential resistors calls for careful observation of the formal and informal structure of an organization.

B. *Gain the support of parents.* Include parents in regular communications. Report successes, be careful not to overpromise, and minimize differences between the new program and the former method of operation. Informal notes home every few weeks may have more impact than long reports.

C. *Know the history of local innovation attempts.* Do not forget the past. Do not plan as if this project were the first attempt ever made in the district or building. How have previous attempts fared? What and who helped or hindered?

Curriculum Development

A. *Assess student needs.* Numerous instruments can be used to assess the educational and skill level of learners. With small adjustments, tests that traditionally have been given at the end of units of instruction can be given at the beginning. Standardized test results can yield basic beginning data. Assessment is a continuing function, and long-term assignment to groups should not be made on the basis of a limited sample of a child's current skills.

B. *Establish objectives.* Based upon assessment, state exactly what is to be learned, how well, and the conditions under which the learning is to be demonstrated. An effective program will contain goals and corresponding objectives to inform students where they are headed.

C. *Provide for variability in choice and sequence of objectives.* The choice and sequence of objectives must be as varied as the students them-

selves. An individualized curriculum calls for alternative paths to reach educational goals.

D. *Ascertain if learner needs are being met.* Review student progress continuously. Don't mistake movement along the wrong path for progress. Make certain that the path the learner has chosen, or been assigned, leads to the fulfillment of his or her needs.

E. *Alter approaches to grading.* Students working on different materials at different rates cannot be graded comparatively. Assessment in smaller doses over materials specifically designed to answer a diagnosed need should result in more successes for learners. Grade accordingly by varying achievement criteria.

F. *Vary the number of groupings.* Move into grouping by starting a few students on a special assignment. Work for the success of these first groups to stimulate confidence in them and interest in others. Early group activities should involve short and specific assignments. As progress is made, groups should be formed based on prior assessment of their skill level.

G. *Evaluate the project.* Check to see if there has been a gain in student achievement, and survey the attitudes of students, parents, and colleagues about their perceptions of the program. Use materials provided by program developers if they are available, or use standardized test results, comparison on common tests with classes not in the project, or a careful matching of experienced perceptions against the specific progress of students toward the major goals of the project.

Classroom Environment

A. *Know your students.* Working with students individually or in small groups requires close personal working relationships between teacher and students. Teachers need to understand learning styles and needs of individuals.

B. *Involve students in the operation of the project.* Just as the principal must involve teachers in decision making, so must teachers involve students. The same principle of growth through ownership applies.

C. *Define the role of students.* Just as teachers must learn new ways of working, so must students. Much effort may have to be devoted to helping students learn how they are expected to behave.

D. *Rearrange the learning environment.* Individualization implies rearrangement. The teacher's role changes from information-giver to that of one who confers, listens, shares decisions, arranges, supplies, provides, and the like.

E. *Encourage a climate for success.* Just as the principal should

strive to create a climate for success within a school building, so should a teacher make the same effort within the classroom. The same principles apply: the development of ownership, respect for the individual, open communications, positive reactions to mistakes, clearly defined roles for those involved, and common sharing of triumphs and frustrations.

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Epilog

Carma M. Hales

How decisions are made about what we do in instruction is predicated on many things. Changes in society influence us. What those in seats of power mandate helps determine our course. The kind of local leadership we have makes a difference. Ultimately though, decisions are made at the classroom level. What is actually done is decided when teachers meet with children.

As we have said previously in this book, the idea of individualization of instruction is not new, easily defined, or effortlessly practiced. Although the concept may be viewed differently by different people, it is an idea almost universally recognized for its importance.

The Association for Supervision and Curriculum Development has long been an advocate of knowing and valuing each child, and of nuturing individuality. Thoughtful people have debated, and continue to debate, how much individuality a democratic society can accommodate. Teachers, who are at the heart of practice, ask: How can I respond effectively to every learner? What difference will individualization really make? Many researchers who study program outcomes question the value of some past efforts in terms of differences made. For those seeking answers to educational problems, there are valid reasons for questioning solutions.

Questioning alone does not remove need. Past failures do not negate the importance of seeking an answer. If we value a responsible and informed citizenry, we cannot escape our mandate to find how to make positive differences with students, which makes the development of such a citizenry possible. When improvement occurs, it is because of effort by individual people. Positive change at a local level, however slight and difficult to measure, is important. Evolutionary improvement in the practice of teaching can result in long-term dramatic outcomes.

The key to being responsive to individual student needs is having educators who care enough to try, to evaluate their efforts in an ongoing way, and to continue to try regardless of circumstances. Perseverance,

with a purposeful focus, is the essential ingredient. When educators settle for less than excellence, it is a tragedy for themselves, for children, and for the society they serve.

There is no one formula which guarantees that, without conflict, schools will improve and individualization will occur. To individualize is to provide the most meaningful learning experience possible for every learner. Children—no matter how affluent, how neglected, or how vulnerable—are our country's most precious commodity.

What is needed to even partially reach the goal of individualized instruction is active dedication to educational improvement. Without such caring, mediocrity in schools can become the norm. This publication offers no panacea. It documents efforts that have been made and demonstrates that children can be reached successfully in a number of ways.

Some contend that the constraints are more human than fiscal; the need for local leadership and commitment to program improvement is clear. People will not persevere unless they believe in what they are doing. Teachers teach what they value. Leaders lead toward goals they believe to be important.

It is essential that what is to be taught and the objectives for instruction, along with how and when it is taught, practiced, and applied, must be carefully planned and tailored. Teacher and students must know where they are, where they have been, and where they are going. We believe that planning, organization, environment management, precision teaching, and evaluation are necessary ingredients to effective instruction.

It has been shown that when children of all ages are placed in responsive learning climates, in which they are valued and helped to succeed, their attitudes and academic achievement improve.

The challenge to build a better place for children is part of the American dream. By continuously expanding our abilities to respond to the needs of learners—by individualizing education—we come closer to reaching this ideal.

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